

# ***JPRS Report***

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# **Environmental Issues**

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# Environmental Issues

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## CONTENTS

5 July 1991

### INTERNATIONAL

Arctic Ecology Conference Opens in Finland [Moscow TASS 13 Jun] .....	1
USSR Foreign Minister on UNEP's 'Rapid Reaction' Center [A.A. Bessmertnykh; Moscow PRAVDA 17 Jun] .....	1
International Ecological Center Set Up in Moscow [Moscow TASS 9 Jun] .....	2
More on New Moscow International Ecological Center [Moscow TASS 10 Jun] .....	2
German-Polish Environmental Council Set Up [Berlin ADN 12 Jun] .....	3
Scientists View Black Sea Ecological Dangers, Improvement Efforts [T.A. Ayzatulin, D.Ya. Fashchuk; Moscow PRIRODA No 1, Jan] .....	3
'Bangkok Statement' Discusses Global Warming [Bangkok BANGKOK POST 13 Jun] .....	8
Beijing Hosts Developing Countries Environment Conference [Beijing XINHUA 14 Jun] .....	9
More on Third World Environment Conference in Beijing [Beijing CHINA DAILY 15 Jun] .....	9
Singapore Official Wants Common ASEAN Stand on Environment [Kuala Lumpur BERNAMA 17 Jun] .....	10
Nigerian Oil Minister, Venezuelan Counterpart on Oil, Environment [Lagos Radio 12 Jun] .....	10

### CANADA

Results of Environmental Poll Reported [LA PRESSE 17 Apr] .....	12
Group Criticizes Ottawa on Great Lakes Pollution [LA PRESSE 4 May] .....	12
Bourassa Comments on Quebec Environmental Policy [LA PRESSE 27 May] .....	12
Minister Presents Draft Law on Quebec Pollution [LA PRESSE 16 May] .....	13
Quebec Minister on James Bay Environmental Study [LA PRESSE 18 May] .....	14

### CHINA

Bureau Releases Report on National Environment in 1990 [RENMIN RIBAO 5 Jun] .....	15
Equal Stress Laid on Development, Environmental Protection [XINHUA 10 Jun] .....	16
Impact of Chinese Population on Environment Analyzed [Qu Geping, Li Jinchang; ZHONGGUO HUANJING BAO 4 Apr] .....	17
State Science Commission To Expand Use of Fly Ash [XINHUA 9 Jun] .....	25
Analysis of Desertification in China Conducted [Zhu Zhenda, Wang Tao; DILI XUEBAO No 4, Dec] .....	25
New Magazine on Population, Environment [Jinan Radio 17 May] .....	35
Guizhou Province Awards Three Mayors for Environmental Work [XINHUA 5 Jun] .....	35

### EAST ASIA

#### CAMBODIA

Kompong Speu Takes Steps Against Forest Depletion [SPK 13 Jun] .....	36
--	----

#### JAPAN

Government To Draft Regulations on Outdoor Bioengineering [KYODO 10 Jun] .....	36
Plan To Survey Tsushima Current, Monitor Pollution [KYODO 14 Jun] .....	36

#### LAOS

Thai Mass Media Reports on 'Yellow Rain' Denied [Vientiane Radio 8 Jun] .....	36
---	----

## SINGAPORE

Steps Taken To Curb Use of Ozone-Depleting Chemicals [THE STRAITS TIMES 17 Jun] ..... 37

## TAIWAN

Economics Ministry Plans Environment Protection Company [Taipei Radio 10 Jun] ..... 37

## VIETNAM

Environmental Conditions in Hanoi Outlined [VNA 9 Jun] ..... 38

## EAST EUROPE

### REGIONAL AFFAIRS

Bulgaria, Romania Meet on Ruse-Giurgiu Environmental Issues [Sofia DUMA 11 Jun] ..... 39  
Japan To Provide Antipollution Technology to Eastern Europe [Tokyo KYODO 10 Jun] ..... 39

### BULGARIA

New Environmental Protection Measures Reported [BTA 14 Jun] ..... 39

### CZECHOSLOVAKIA

Drinking Water Situation Described as 'Critical' [PRAVDA 7 Jun] ..... 40

### HUNGARY

Briefing on Soviet Army's Environmental Damage [Budapest Radio 10 Jun] ..... 40

### POLAND

Bielecki Proposes Debt Swap for Ecological Projects [PAP 11 Jun] ..... 40

### YUGOSLAVIA

Kamenica Dump Radiation Levels Four Times Legal Limit [TANJUG 8 Jun] ..... 41

## LATIN AMERICA

### REGIONAL AFFAIRS

Developed Countries Use Caribbean as 'Dump Sites' [Bridgetown CANA 12 Jun] ..... 42

### BAHAMAS

Cause of Conch Contamination To Be Investigated [Bridgetown CANA 13 Jun] ..... 42

### BOLIVIA

Experts Report 30 Percent Annual Decrease in Forests  
[Buenos Aires NOTICIAS ARGENTINAS 9 Jun] ..... 42

### BRAZIL

Zelia's Exit Seen To Favor Environmental Sector [CORREIO BRAZILIENSE 10 May] ..... 43  
Document Reveals Government Plans for Amazon Region [FOLHA DE SAO PAULO 11 Jun] .... 43

## CHILE

Degree of Santiago Area Pollution Summarized [LA NACION 2 May]	44
Waste Contaminates Marine Products [EL MERCURIO 2 May]	45
Pollution Leads to Restrictions, Closures in Santiago [Madrid EFE 14 Jun]	47

## CUBA

Claims That Cuban Nuclear Power Station Is Unsafe Rebutted [Moscow IZVESTIYA 13 Jun]	47
--	----

## HONDURAS

Capital's Mean Annual Temperature Up 1 Degree Centigrade [LA TRIBUNA 27 Apr]	47
'Enormous' Forest Fires Burn Unopposed [EL HERALDO 23 Apr]	48
1,702 Forest Fires Consume 26,342 Hectares [EL HERALDO 26 Apr]	48

## NICARAGUA

Benefits of Reforestation Program Explained [LA PRENSA 7 May]	49
Pollution, Soil Erosion on Atlantic Coast Noted [EL NUEVO DIARIO 18 Apr]	50

## NEAR EAST/SOUTH ASIA

### REGIONAL AFFAIRS

War Damage to Gulf Evaluated [London AL-MAJALLAH 24 Apr]	52
--	----

### EGYPT

Officials, Scholars View Nile Water Wastage [AL-AKHBAR 29 Mar, 1 Apr]	56
Need To Store Nile Water in Northern Lakes [AL-AKHBAR 23 Apr]	61

### INDIA

Use of Leather-Treating Pentachlorophenol Banned [Delhi Radio 7 Jun]	63
--	----

### ISRAEL

Minister Ne'eman Foresees Nuclear Power Plant Within 1 Year [Jerusalem Radio 12 Jun]	63
Experimental Oil Shale Power Plant Proves Success [THE JERUSALEM POST 11 Jun]	64

### MOROCCO

King Calls for Conference To Share Water Expertise [London AL-SHARQ AL-AWSAT 15 May]	64
Majority of Forests Threatened by Development [RISALAT AL-UMMAH 7 Apr]	64

### NEPAL

Japan Grants 3 Million Dollars for Forestry Development Plan [AFP 9 Jun]	65
--	----

## SOVIET UNION

Zalygin Sees Shortcomings in National Environmental Policies, Institutions [S. Zalygin; TRUD 5 Jun]	66
Official Views Pollution Effect on Public Health, New Legislation [V. Chiburayev; TRUD 15 May]	68
Public Hearings on Ecology Held in Moscow [TASS 8 Jun]	69
Defense Ministry, Ecologists Have 'Much Mutual Work Ahead' [Moscow International 7 Jun]	70
Cabinet Adopts Resolution on Chernobyl Program [PRAVDA 8 Jun]	70
Goskomgidromet Chairman Izrael on Chernobyl Contamination Zones [Yu.A. Izrael; PRAVDA 26 Apr]	71



Chernobyl Clean-Up Progress Reviewed; Health Problems Noted [IZVESTIYA 26 Apr]	78
Ukrainian Health Minister on Chernobyl Issues [Yu.P. Spizhenko; TRUD 25 Apr]	82
Chernobyl Clean-Up Mismanaged [SILSKI VISTI 29 May]	85
Ukrainian Objections to IAEA Report on Chernobyl [Kiev Radio 11 Jun]	87
Belorussians Criticize IAEA Chernobyl Conclusions [Minsk Radio 11 Jun]	88
Death Rate of Chernobyl Rescue Workers Rises [Kiev International 8 Jun]	88
Statistics on Chernobyl Radiation Deaths [KRASNAYA ZVEZDA 13 Jun]	88
Scientist Claims Chernobyl Reactor 'Contained a Bomb' [INTERFAX 14 Jun]	88
Authorities Draft Measures To Improve Moscow Environment [TASS 13 Jun]	89
Moscow TV Airs New Ecological Program [Moscow TV 8 Jun]	89
Scientists Want Leningrad Barrier Construction Stopped [TASS 7 Jun]	90
KGB 'In No Hurry' To Pursue Green Politicians' Attackers [KOMSOMOLSKAYA PRAVDA 8 Jun]	90
Leningrad Firm Offers Device To Save Fuel, Reduce Auto Emissions [TORGOVAYA GAZETA 18 May]	90
Investigation of Lake Ladoga Nuclear Experiments Updated [IZVESTIYA 17 Apr]	91
1990 White Sea Pollution Investigation Continues To Produce Theories [K. Belyaninov, et al.; KOMSOMOLSKAYA PRAVDA 8 Jun]	93
More on White Sea Contamination Investigation [KOMSOMOLSKAYA PRAVDA 13 Jun]	98
Environment Minister Hopes for Nordic Subsidies [Helsinki Radio 12 Jun]	98
Source of Radioactive Contamination in Mikun Explored [SOVETSKAYA ROSSIYA 6 Jun]	98
Lemeshev Scores Foreign Influence, Stalin, Others in Volga Development Schemes [M. Lemeshev; PODMOSKOVYE No 17, 27 Apr]	98
Green Party Leader Appointed Ukrainian Ecology Minister [Moscow Radio 19 Jun]	100
Gas-Fired Thermal Power Station To Replace Crimean Nuclear Plant [Moscow TV 14 Jun]	101
Plans for Kirovograd Ore Plant Criticized [Moscow TV 2 Jun]	101
Rising Caspian Floods Coastal Land, Endangers Industries [Moscow TV 8 Jun]	101
Baku Conference Hears of Dangers to Caspian Sea [Moscow Radio 13 Jun]	102
Ministries Announce Findings in Sverdlovsk Pesticide Poisoning Case [PRAVDA 15 May]	102
Special Program Improving Ecology in Kazakhstan Gas Field [Moscow TV 12 Jun]	103
Kazakh Deputies Appeal to World Health Organization [TASS 13 Jun]	103
Semipalatinsk Nuclear Test Site Visited [Moscow TV 8 Jun]	104
Central Asian Cloud Seeding Experiments Criticized [KOMMUNIST TADZHIKISTANA 13 Apr]	105
Heightened Morbidity in Altay Kray Associated With Contaminants [PRAVDA 25 Apr]	107
Novel Sorbent Permits Petroleum Reclamation [Moscow TV 10 Jun]	109

## WEST EUROPE

### REGIONAL AFFAIRS

ESA Inaugurates Earth Observation Coordination Center [Paris AFP SCIENCES 18 Apr]	110
Swedish Deputies Approve Oeresund Bridge to Denmark [AFP 13 Jun]	110

### FRANCE

Nation Seen Lagging on Environmental Standards [Vienna DIE PRESSE 30 Apr-1 May]	110
Company To Build 100 kW Chemical Heat Pump Prototype [INDUSTRIES ET TECHNIQUES 8 Mar]	111
Company Presents 'Clean' Circuit Soldering/Cleaning Machine [INDUSTRIES ET TECHNIQUES 22 Mar]	112
Renault Studying Auto Parts Recycling [AFP SCIENCES 28 Feb]	112

### GERMANY

'Environmental Crimes' Caused by Soviet Army Described [BILD AM SONNTAG 9 Jun]	113
--	-----

### ITALY

FIAT's Ecological Programs Outlined [L'ESPRESSO 12 May]	114
---	-----

## Arctic Ecology Conference Opens in Finland

LD1406093291 Moscow TASS in English 2203 GMT  
13 Jun 91

[By TASS correspondent Aleksandr Surikov]

[Text] Rovaniemi, Finland June 14 TASS—The distance between the town hall of Rovaniemi and the polar circle is eight kilometres. This proximity is directly related with an international conference that opened here on Thursday. The topic of the conference, the first one of this kind held on the intergovernmental level, is the protection of the environment of the Arctic region. It is being attended by representatives of Finland, Denmark, Iceland, Norway, Sweden, the USSR, Canada and the United States. Britain, Poland, Germany, associations of native peoples of the north and some international organisations are represented as observers.

The idea to hold a conference of the "Arctic eight" was first expressed by Finland. Its government came up with this initiative in January 1989. The intergovernmental conference was preceded by several meetings of experts.

Opening the conference, Finnish Foreign Minister Paavo Vaeyrynen stressed that ecology should become a priority sphere of international cooperation. Ecological danger is becoming even more serious for humanity than the threat created by armaments, he said. Pollution has no boundaries. The rapid deterioration of the natural environment in many parts of the Arctic, where ecological systems are highly vulnerable and fragile, evokes serious concern. Multilateral cooperation of Arctic states for the purpose of protecting the environment of that vast region is becoming an urgent necessity.

Other participants in the meeting also spoke about the importance of broad international cooperation in the Arctic. Quite recently this region was regarded only in the setting of military-political interests and military activities, said Yuriy Maslyukov, USSR deputy prime minister and head of the Soviet delegation. But the present situation is characterised by a dramatic turn we are making in all international affairs. Perestroika and the course towards a radical transformation of our society, connected with the tackling of global problems, made us view problems of the northern regions from a different angle. Speaking in Murmansk on October 1, 1987, and then in Helsinki, on October 27, 1989, our President Gorbachev supported the idea of a broad dialogue and cooperation on all problems of the region, as well as its turning into a zone of genuine peace and fruitful cooperation, Maslyukov pointed out.

This conference is opening up a new stage in Arctic cooperation. In this connection we should like to call attention to the idea expressed here by the Canadian representative—to create a council of Arctic countries. The implementation of this proposal could be an important next step in the development of cooperation between countries of the region. We are ready to discuss the idea, Maslyukov pointed out in conclusion.

Friday will be the concluding day of the conference.

## USSR Foreign Minister on UNEP's 'Rapid Reaction' Center

PM1906102591 Moscow PRAVDA in Russian  
17 Jun 91 Second Edition p 5

[Unattributed interview with USSR Foreign Minister A.A. Bessmertnykh under the "Our Interview" rubric; no place or date given: "Ecological 'First Aid.' Replies by USSR Foreign Minister A.A. Bessmertnykh"]

[Text] [Question] It is well known that a few days ago the 16th session of the United Nations Environment Program [UNEP] Governing Council adopted a decision creating a Center for Urgent Ecological Assistance. The proposal to set it up was one of the several major initiatives contained in M.S. Gorbachev's December 1988 speech at the 43d UN General Assembly session. What is your appraisal of this event?

[Bessmertnykh] This is a kind of breakthrough both politically and from the viewpoint of the practical solution of global environmental protection problems through joint efforts by the world community's members. We have here a specific expression of ecological diplomacy geared to creative quest for universally acceptable solutions, regardless of how hard this quest might be.

The two-and-a-half years since December 1988 have witnessed intensive work to develop the extraordinary idea proposed by M.S. Gorbachev. It must be said that the worldwide reaction to this idea was far from unambiguous from the very beginning. Reactions varied over a rather broad range—from agreement in principle to doubts and rejection "out of hand." Having analyzed the complete spectrum of opinions, we submitted to the United Nations a lengthy substantiation regarding the center's objectives and tasks and its functions at the initial stage. This stance of welcoming partners' opinions and favoring the arrival at a common balance of interests, coupled with readiness to "begin with our own selves," was of great help in developing an objective and constructive dialogue free from confrontation and polemics. As conceptual and practical work progressed at the United Nations, primarily at UNEP, the idea about the center was enriched by fresh elements like, for example, Britain's proposal to set up a register of ecological expertise.

Moreover, the ecological disaster in the Persian Gulf zone dramatically highlighted the need to have an international rapid reaction mechanism to counter extreme pressures on nature.

This objective need has now been translated into practical measures. The UN Center for Urgent Ecological Assistance will start work in early 1992.

[Question] What will be the new center's functions and the forms of the USSR's participation in its activity?

[Bessmertnykh] At the initial stage, the center will take actions at the request of relevant governments and will maintain lists of experts and equipment to be used in ecological emergency situations. The center will operate on an experimental basis for 18 months and will thus undergo a reliable practical test, making it possible to introduce any amendments that might be necessary afterwards.

A list has been submitted to the United Nations containing the names of 33 Soviet scientists and specialists whom the USSR Government is prepared to second on recommendation by the Center for Urgent Ecological Assistance. Thus our participation in the center's work will be active and direct from the very beginning.

[Question] How important is the center's creation in the context of preparations for the UN Conference on the Environment and Development?

[Bessmertnykh] The center's creation is an important practical action on the eve of this major international forum, and boosts the conference's conceptual and practical potential. It is fundamentally important that a start has been made on a real move along the avenue of universal ecological security. A transition is under way from declarations to joint specific and practical actions which are vitally necessary for our planet's ecological revival, the main task facing the 1992 conference.

#### **International Ecological Center Set Up in Moscow**

*LD0906232291 Moscow TASS in English  
2135 GMT 9 Jun 91*

[By TASS correspondent Sergey Ustyukov]

[Text] Moscow June 10 TASS—An international ecological centre opened here on Sunday. It has been established on the initiative of the Soviet Union's nongovernmental ecological organisations.

The goal of these organisation is to press for the establishment of free ecological and economic zones in the country and for the introduction of worldwide ecological monitoring.

A ceremony to inaugurate the centre, which is located on the site of the country residence of former Soviet leader Leonid Brezhnev, was attended by Maurice Strong, general secretary of a UN environment and development conference, who is currently here on an official visit at the invitation of the Soviet Government.

The conference is to be held in Brazil in June 1992. On a proposal by Soviet President Mikhail Gorbachev, the conference is meant to bring together the heads of state and government for the first time to discuss urgent ecological problems.

When Maurice Strong was meeting representatives of business circles and ecological organisations of the Soviet Union, Andrey Chernukhin, general director of the Ecoprom ecological consortium, told him that talks

were under way with the Soviet defence minister on stationing an ecological rapid reaction force at two Soviet military bases on German territory, capable of helping to eliminate the aftermath of natural calamities in any point of the globe.

#### **More on New Moscow International Ecological Center**

*LD1106033291 Moscow TASS in English  
1559 GMT 10 Jun 91*

[By TASS correspondent Leonid Timofeyev]

[Text] Moscow June 10 TASS—An international ecological centre opened in Moscow last Sunday. It was created on the initiative of nongovernmental ecological organisations of the Soviet Union, including the Ekoprom ecological consortium.

The centre's aim is to create free ecological and economic zones in the country and the introduction of the global ecological monitoring system.

UN Under Secretary General Maurice Strong, who is now visiting the Soviet Union as the head of the preparatory committee for the UN conference for the environment and development at the invitation of the Soviet Government, and representatives of the USSR Foreign Ministry and the government of the Russian Federation attended the opening ceremony which was held in the summer residence of the former Soviet leader Leonid Brezhnev outside Moscow. A group of Soviet and foreign researchers and specialists is already working at the international ecological centre to develop ways to eliminate toxic industrial waste. Another problem they are planning to tackle soon is the removal of heavy metals from water.

The Moscow centre is only one component of the plan designed by the Ekoprom consortium for the creation of an international ecological foundation. The consortium's first deputy director-general, Dr. Albert Aldoshin, told TASS that the idea of establishing an international centre of this kind originated after the Persian Gulf war, which caused considerable water and air pollution in the Gulf.

"Individual states can hardly cope with major ecological disasters," Aldoshin said, "this is why the need is now ripe to pool efforts and resources".

According to the Soviet researcher, the foundation has no intention to beg the government for money. Its own commercial activity can provide enough resources to pay for the implementation of a number of major programmes in the field of nature protection.

The holding of an ecological lottery in the USSR within the next few months is one of the events to raise money for the purpose. Money raised in this way will be used to

buy and install ecologically clean technologies at biological and chemical industrial enterprises. The modernization of such enterprises is long overdue: 26 pharmaceutical and chemical enterprises have had to be closed in the USSR because of their harmful discharges, which in turn created tensions in supplying medicines to the people.

The consortium is now conducting negotiations with the Soviet defence minister on deploying at two Soviet military bases on German territory ecological emergency forces to render rapid relief assistance to areas hit by ecological disasters. The bases will be used to deploy equipment needed to fight forest fires both in Europe and beyond the Urals.

Soviet ecologists have numerous other plans and projects that can be implemented with the help of the newly established international ecological foundation. This idea has been met with interest not only by environmentalists but also by Western business communities.

#### **German-Polish Environmental Council Set Up**

*LD1206150891 Berlin ADN in German 1251 GMT  
12 Jun 91*

[Text] Bonn (ADN)—The Federal Cabinet decided to establish a German-Polish environmental council at its session in Bonn today. Federal Environment Minister Klaus Toepfer stated that the council marks the start of a new era in environmental cooperation after the restoration of German unity and is an expression of the reshaping of relations between the two countries that is taking place at the moment. Using as its model the German-French environmental council, it is to provide a forum for the ministers responsible to discuss regularly the strategic questions of principle and to establish the focal points for cooperation.

#### **Scientists View Black Sea Ecological Dangers, Improvement Efforts**

*91WN0426A Moscow PRIRODA in Russian No 1,  
Jan 91 pp 69-74*

[Article by Tamerlan Afyatovich Ayzatulin and Dmitriy Yakovlevich Fashchuk: "The Black Sea: Imaginary and Real Catastrophes"]

[Text] Soviet and American specialists have separately established a trend toward a rise in the average level of the water containing hydrogen sulfide in the Black Sea in recent years, along with its abnormally high (up to 50 meters in depth) position in certain portions of the body of water.<sup>1</sup> Reports appeared soon after this on a declassified report to the chief of an administration of the Black Sea Fleet relating to the period of the Crimean earthquake of 1927. It talks about the "columns of flame" and "outbursts of white fire" up to 500 meters high and 1.5-2 kilometers wide that were observed on the sea near Sevastopol and Yevpatoriya.

The reaction to these events was striking: "What will happen if, God forbid, a new earthquake occurs at the shores of the Black Sea? Fires at sea again? Or a single explosion, one grandiose torch? Hydrogen sulfide is flammable and toxic... would there be hundreds of thousands of tons of sulfuric acid in the sky...?" (LITERATURNAYA GAZETA, 1989, No. 24); "A quite small earthquake, so that the hydrogen sulfide reaches the surface of the Black Sea and catches fire, and its shore would be turned into a desert" (RABOCHAYA TRIBUNA, 1990, No. 70); "A sufficient coincidence in time and space... of a sharp drop in atmospheric pressure and vertical currents.. The water, boiling up, would saturate the air with toxic vapors of flammable gas. Only God knows where the deadly cloud would drift... It could cause casualties on the shore, and could turn a passenger liner into the 'Flying Dutchman' in a matter of seconds" (SOVERSHENNO SEKRETN, 1989, No. 5).

The list of quotes could be continued, supplementing it with excerpts from the mass of letters to the USSR Supreme Soviet from alarmed inhabitants of the Black Sea coast. They, like the majority of features in the press, close with a demand for the immediate salvation of the sea. "Either we will become witnesses to an unprecedented ecological catastrophe... or the world will be given a great example of perspicacity and righteous technological might" (LITERATURNAYA GAZETA, 1989, No. 24). The authors of the newspaper features and collective letters propose, as the "great example," a project to reduce the level of the hydrogen sulfide layer through pumping the "excess" from the depths with the concurrent extraction of sulfur, manganese, silver and other metals, as well as the use of the hydrogen sulfide as a fuel.

The proposal for the power-engineering recovery of the hydrogen sulfide in the Black Sea waters was evidently expressed for the first time at the 1st Congress of Soviet Oceanographers in 1977 by hydrophysicist A.S. Vasilyev. It was discussed repeatedly at the beginning of the 1980s, but did not go beyond the bounds of popular-science features<sup>2</sup> due to the unprofitability of large-scale production, and no practical steps were undertaken toward its implementation.

This project, after many replacements of its originating and developer organizations, at a cost of five billion rubles and under the name of Black Sea Ocean Technology, has been sent for review to the Institute of Oceanology imeni P.P. Shirshov of the USSR Academy of Sciences. Its last author, A.K. Ryazanov (a colleague and comrade-in-arms of the prior ones), is proposing halting the rise in the waters containing hydrogen sulfide by pumping 2,500 cubic kilometers of water a year from a depth of 1,200 meters using pipes three meters in diameter—12 times the annual flow of the Danube—and compensating for the costs of saving them from an "ecological catastrophe"—the "eternal freeze" reaching the surface of the Black Sea—with the extraction of sulfur and metals from that water.



The city of Novorossiysk is offering territory for the development and realization of the project—undoubtedly more vast than the recently rejected plan to turn the northern rivers to the south (that discussed removing about six cubic kilometers in all from the northern rivers)—in connection with which the project has received the name of the “Novorossiysk ‘Panama’” among the chemists.

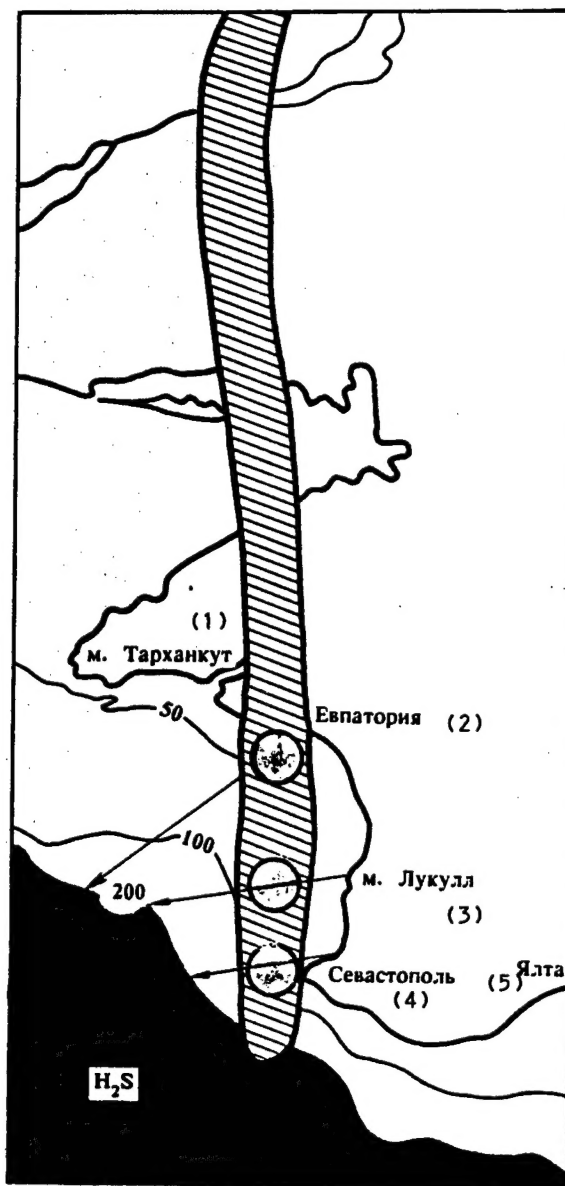
There should be no doubts of the seriousness of the intentions to save the sea after the fact that the leader of our country declared, from the podium of the Global Forum for the Protection of the Environment and Development for the Purpose of Survival, that “The upper boundary of the hydrogen sulfide layer in the Black Sea over recent decades has risen from 200 meters to 75 meters from the surface. A little more and it will move across the threshold of the Bosphorus into the Sea of Marmara and the Aegean and Mediterranean Seas” (PRAVDA, 20 Jan 90).

We have tried to analyze the realism of the apocalyptic forecasts based on the contemporary level of knowledge of the nature of the Black Sea and the properties of the hydrogen sulfide, with a regard for the achievements of mathematical modeling.

The seismicity of the Black Sea region is confined to the periphery of the Black Sea Depression, and its central deepwater portion has little seismicity.<sup>3</sup> The Crimea, as opposed to other coastal regions of the Black Sea, is typified by narrowly localized seismic activity, the zone of which is located here along the steep continental incline of a continuous belt from Sevastopol to Feodosiya, with minimal activity at Yalta. About 100 earthquakes with a force of five-eight have been noted in the Crimea over the last 100-plus years, and an outburst of seismicity accompanied by a force-9 earthquake that surpassed the famous Tashkent (1966) earthquake by a hundred-fold was observed in 1927-30. A maritime block of the earth's crust in the region of the southern shore of the Crimea—a distance of about 100 km from the shore—fell away as the result of tectonic shoving on 11 Nov 27, and the continental block was uplifted. The effect of this natural disaster proved to be narrowly localized and did not extend to the principal portion of the body of water occupied by the hydrogen sulfide zone. The earth's crust under a section of the sea with hydrogen sulfide content dropped away at the epicenter of the earthquake, located 25 km from Yalta, which could in no way lead to it reaching the surface.

According to the data of observations, outbursts of fire at sea were noted at night during the Crimean earthquake from the direction of Yevpatoriya, Sevastopol and Cape Lukul to the west (a bearing of 255-260°). Plotting that information on a map, it is not difficult to become convinced that the “sea was on fire” over depths not exceeding 100 meters—in places where hydrogen sulfide has never been in the bottom layer. The closest distance from the boundary of the hydrogen sulfide zone (150-200-meter isobaths) in that direction to Sevastopol is

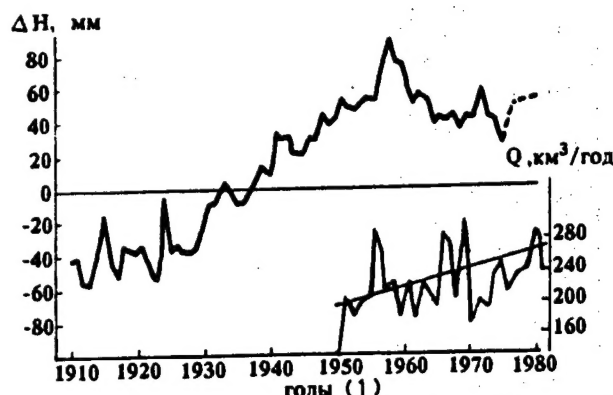
60-100 km, and more than 200 km to Yevpatoriya, which rules out the possibility of seeing the fire even at night.



Contiguity of “sea fires” during the Crimean earthquake and the Krivoy Rog—Yevpatoriya fault zone (shaded area) extending close to the eastern Crimea, and their “remoteness” from the hydrogen-sulfide zone, here colored black.

Key:

1. Cape Tarkhankut
2. Yevpatoriya
3. Cape Lukull
4. Sevastopol
5. Yalta



Changes in the level of the world's oceans ( $\Delta H$ , mm) and the flow of the Danube ( $Q$ ,  $\text{km}^3/\text{year}$ )

Key:  
1. Years

The cause of the "sea fires" becomes understandable after analysis of the geological structure of the north-western shelf of the Black Sea—a typical gas-bearing region of the world's oceans. It is transected by four major faults in the longitudinal direction, separating the principal structural elements of the Black Sea region. Drilling rigs for the production of natural gas are currently operating in the zones of these faults. An expedition of the Institute of Biology of the Southern Seas of the UkSSR Academy of Sciences led by G.G. Polikarpov has currently detected places here where natural gas in the form of "flares" has reached from 50-70 to 200-300 meters at the bottom (depths of 62 to 400 meters), and in one case "in a fault two miles long" (SLAVA SEVATOPOLYA, 1989, No. 139). The "sea fires" have been observed in the water located over the Krivoy Rog—Yevpatoriya fault. The production of gas is not underway there today, but the activation of sources of it in an earthquake, right up to the emergence of "flares" to the surface and ignition, is entirely realistic.

The maximum concentration of hydrogen sulfide in the water of the Black Sea is 13 mg/liter, which is 1,000 times less than that necessary for 100-percent saturation and its exit from the water in the form of gas. The conditions for an explosion or ignition of such a solution are difficult to create even in a laboratory (explosive concentrations for hydrogen sulfide in the air comprise 4.5-45 percent, while the ignition temperature is 250°C). People have moreover long made use of open sources of hydrogen-sulfide waters in which concentrations exceed the Black Sea waters by hundreds of times, and not a single explosion, for example at the well-known Matsest, has been noted therein. Encounters have been described with hydrogen-sulfide streams in mines; they have been accompanied by the poisoning of people and changes in the color of flame in open lamps to green, but not—as opposed to methane—explosions.

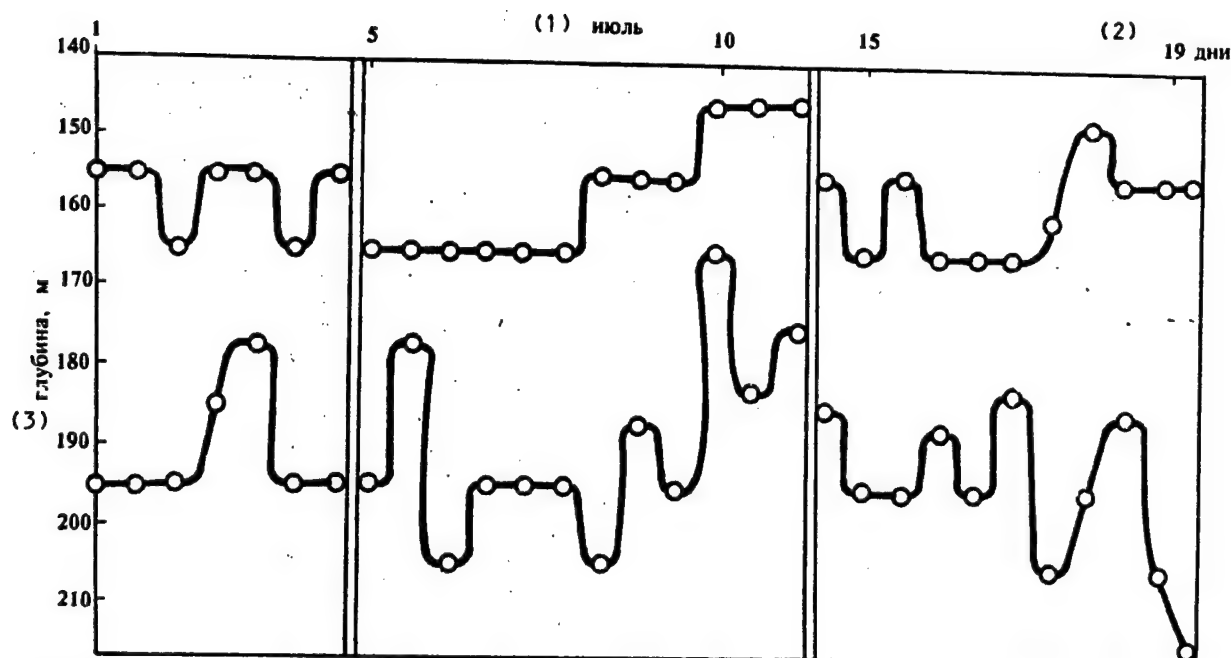
Lethal concentrations of hydrogen sulfide in the air are 670-900  $\text{mg}/\text{m}^3$ , and disruptions in the central nervous

system occur at 270  $\text{mg}/\text{m}^3$  and poisoning at 70  $\text{mg}/\text{m}^3$ . The minimum concentration just to bear an odor—2  $\text{mg}/\text{m}^3$ —is difficult to achieve under the actual conditions of the Black Sea in a hypothetical instantaneous discharge of the waters at depth to the surface in the air over the sea. There is thus no need to fear any "Flying Dutchmen," and the population of the shore is not threatened by any danger from the the hydrogen sulfide even under the most fantastic of circumstances. But what about the population of the sea, does a danger exist for it? Such a forecast is possible when clarifying the causes that determine the dynamics of the boundary of the anaerobic zone.

One of the reasons could be the man-made unrecovered water consumption that has reached, for example, 80 percent of the outflow of the Jordan River in the Dead Sea, and has led to an increase in the salinity of the surface layer, its leveling off with depth and the intensive displacement and release of the hydrogen sulfide contained in the water to the surface. Over the last 30 years, however, over the course of which a rise has been observed in the boundary of the anaerobic zone in the Black Sea, the flow of the Danube (an average of 200 of the 346 cubic kilometers of river water entering the sea in a year) has increased rather than decreased.<sup>4</sup> The flow of the Danube—as the result of drawing for irrigation—has been virtually unchanged (45  $\text{km}^3$ ) despite the increased water flow during that period. The total river flow into the Black Sea is increasing thereby. Fresh water drawn for the needs of the national economy are on the scale of 15-20 percent of the overall annual flow, and have been more than compensated for recently by nature in the process of the humidification of the climate, while the salinity of the surface layer is manifesting a trend toward reduction. The anthropogenic factor is consequently not proving to have a fundamental impact on the hydrological structure of the open portion of the Black Sea, as occurred in the Dead Sea, and is not the cause of the rise in the boundary of the anaerobic zone. The additional influx of water has led, at the same time, to an increase in the difference of the densities of the surface and deeper layers of the Black Sea. Modeling calculations performed at the Sevastopol Division of the State Oceanographic Institute have shown that this could decrease the depth to which the water enriched with oxygen penetrates in winter convective intermixing and, consequently, cause a rise in the hydrogen-sulfide zone.

Researchers from the Maritime Hydrophysiological Institute of the UkSSR Academy of Sciences propose that another factor disrupting the stability of the position of the boundary of the anaerobic zone could be the long-term changes in the level of the Black Sea in synchrony with the fluctuations in the level of the world's oceans, which levels are increasing an average of 1.4-1.5 mm a year today.<sup>5</sup>

The changes in the rate and nature of atmospheric circulation over the sea—determining, in turn, the rate of ascending movements in the body of water—could also have an analogous effect.



Changes in the position of the upper boundary of the hydrogen-sulfide zone (the layer of co-existence of hydrogen sulfide and oxygen) in the Yalta area under the effects of synoptic processes

Key:

1. July

2. Days

3. Depth, meters

A correlational analysis of a series of the average depths of occurrence of the boundaries of the anaerobic zone in the summer  $H_s$  (meters), changes in the level of the world's oceans  $\Delta H$  (mm) and the atmospheric (average annual  $P_{avg}$  and average May  $P_M$ ) pressure (gPa) in Yalta testify to the statistically trustworthy link between them:

$$H_s = 0.37\Delta H + 121.4;$$

$$H_s = 5.87P_{avg} - 5,770;$$

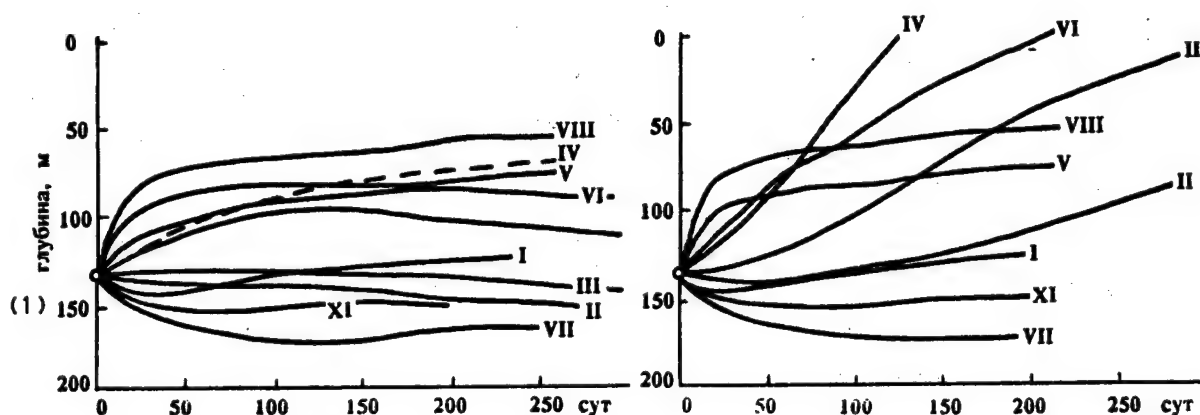
$$H_s = 2.91P_M - 2,790.$$

Forecasts according to these equations are corrected only for the conditions under which they are obtained, since the changing factors of the environment should enter into them with their dependencies. Simple calculations show nonetheless that it is necessary, for the hydrogen sulfide to reach the surface, that the level of the Black Sea rise by 330 mm or the average May pressure at Yalta drop to 958.7 gPa. The former could occur (at the contemporary rate of rise) in 220 years, while the latter is unrealistic (the lowest average May pressure at Yalta over the observation period was 1,000.8 gPa). All of the natural mechanisms listed are moreover of a cyclical nature, so the established trend toward a rise in the boundary of the anaerobic zone in the Black Sea, evidently brought about by their cumulative effect operating in the same direction, cannot be extrapolated in linear fashion into the future. There are thus grounds to

assume that an "ecological catastrophe" from the effects of long-term changes in the climate does not threaten the population of the Black Sea, as well as the Marmara, Aegean or Mediterranean seas.

An abnormally high position of the boundary of the anaerobic zone is currently present, despite the optimistic assessments presented. It has become susceptible to the dynamic influences of the mesoscalar eddies in the open part of the sea and the tidal surging of the coastal regions. Could these natural mechanisms lead to the water containing hydrogen sulfide reaching the surface in individual locations, which would have grievous consequences for the inhabitants of the sea, for example, during the period of spawning?

The boundary of the anaerobic zone reacts to the force of the wind (changes in atmospheric pressure) in 12 hours in the most dynamically active region—the southern shores of the Crimea—and this reaction lasts for two days.<sup>6</sup> Its depth here during the summertime can be calculated according to the formula  $H_s = -583 + 0.73P_{at}$ , where  $P_{at}$  is a reading of the pressure at Yalta shifted by two days. The pressure cannot be more than 800 gPa for it to reach the surface. But pressures below 883 gPa have not been recorded even in tropical cyclones of group six



Results of modeling calculations of the position of the upper boundary of the hydrogen-sulfide zone with real (left) and 1,000-fold increased (right) strength of the source of hydrogen sulfide. Its rise to the surface occurs only in the event of a sea homogeneous in density (curves III, IV and VI) with a 1,000-fold increase in strength.

Key:

1. Depth, meters.

(the most powerful). The likelihood of local "catastrophes" in the coastal portion of the sea from the effects of synoptic processes thus also proves to be very doubtful.

Finally, there is one more possible mechanism for a rise in the boundary of the anaerobic zone in the Black Sea—a change in the power of the sources of the hydrogen sulfide as a result of the anthropogenic eutrophication of the sea (an increase in the amount of organic substances entering it). This process has proven to be one of the determinants in the development of hydrogen-sulfide waters during the summertime in the shallow sections of the northwestern shelf. There have until recently been no quantitative evaluations of its contribution to the rate of production of hydrogen sulfides in the deeper portion of the sea. We set various versions of the hydrological structure of the sea (distribution of the conditions of exchange on the vertical right up to complete equality in density by depth) in 11 machine-modeling experiments<sup>8</sup> and combined them with four scenarios for various powers of the sources of hydrogen sulfides (they varied by 1-3 orders of magnitude). It turned out that the position of the boundary of the anaerobic zone is determined by the position of the layer with the minimum rate of vertical exchange, and is only slightly dependent on changes in the flow of hydrogen sulfide. With a real value of this magnitude corresponding to contemporary quantitative values, even with the sea homogeneous in density, the boundary of the anaerobic zone not only does not reach the surface, but even drops due to improvements in the aeration of the deeper layers. A hundred-fold increase in the power of the source of hydrogen sulfides causes a rise in the boundary by 40 meters, but it does not reach the surface even then. Only a 1,000-fold increase in its power, in a sea homogeneous in density, has that result.

An "ecological catastrophe" is impossible even under these fantastic conditions with preservation of the stratification of the water.

The rapidity and simplicity with which plans for the pumping of "excess" from the sea—a most serious operation on the body of nature—are born is dispiriting. The "state of health of the patient" herein—which could be ascertained at any institute in the oceanographic field of the Academy of Sciences, hydrometeorology or the Minrybkhov [Ministry of the Fishing Industry]—is of no interest to anyone, since serious information is being replaced by myths. This substitution, in our opinion, is testimony to a true social catastrophe! The unrestrained technological development of civilization, transpiring against a background of hypertrophied development of technocratic knowledge with the dystrophy of natural sciences, has us facing the danger of a degradation of the environment within the lifetime of a single generation. Not one victory over nature is known, in the almost half-century campaign to subjugate it, that has not later turned into a disaster for the "victors" or, more likely, their descendants. Our feeling of oneness with nature has atrophied, on the other hand, along with the desire and ability to think about the future and an elementary instinct for self-preservation.

The energetic advance of the plan to "save the Black Sea" that started in 1984 has fortunately been stopped. Judging by newspaper features, its authors are now asking not for five billion rubles, but just 250,000-300,000 to resolve "fundamental issues of technology" that will guarantee an economic impact of 89.9 million rubles (SLAVA SEVASTOPOLYA, 1990, No. 63). But there were no fewer guarantees from the cascade of



Dnieper reservoirs, the drawing of water from the Central Asian rivers, the Danube-Dnieper Canal, the water-management projects on the Volga and Kuban and the "assimilation" of Baykal. We know very well today where all of that ended up.

Today it is possible to list dozens of resolutions and decrees by soviet and party bodies, on both the all-union and republic scales, concerning questions of the ecology and protection of the environment in the Black Sea basin. All of them contain the terms "strengthen," "unite," "concentrate" and the like. The "Black Sea" and "Seas of the USSR" plans of the GKNT [State Committee for Science and Technology], as well as the draft "Program of Biospheric and Ecological Research of the USSR Academy of Sciences to the Year 2015" and the "South" comprehensive program of the USSR Ministry of the Fishing Industry, invariably contain the phrases "comprehensive nature of research," "systems approach" and "ecological monitoring." Nonetheless, as we see, nothing has happened. It is not a matter of directives and programs.

The lack of culture in the age of scientific and technical revolution has led to the fact that instead of "hands-off" preserves, the woeful masters have come to be guided in their activity by the frivolous theory of "lose something here, find something there," camouflaging their true stance—"Après nous le déluge." The sorry results of this substitution have justified to the full the prophecy that the road to hell, especially ecological, is paved with good intentions. We will hope that the changes that have begun in this country will allow us to get out of it, ridding us in the future of the true catastrophe threatening not only the Black Sea, but all of nature and, consequently, we ourselves and our children today!

#### Footnotes

*Tamerlan Afiyatovich Ayzatulín, senior scientific staff member of the All-Union Institute of Scientific and Technical Information of GKNT [State Committee for Science and Technology] and the USSR Academy of Sciences. Engaged in problems of ecological chemistry and mathematical modeling of transformation of substances in an aqueous environment. Participant in many maritime expeditions.*

*Dmitriy Yakovlevich Fashchuk, candidate of geographical sciences, lead scientific staff member at the Azov-Black Sea Scientific-Research Institute of the Maritime Fishing Industry and Oceanography of the USSR Ministry of the Fishing Industry. Scientific interests connected with physical oceanography.*

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#### 'Bangkok Statement' Discusses Global Warming

BK1306021091 Bangkok BANGKOK POST in English 13 Jun 91 p 2

[Text] About \$50 billion which passes annually from poor to rich nations must be reversed to pay for solutions to global warming—with a rising sea level—and to promote sustainable development.

This proposal is among recommendations under the "Bangkok Statement" drawn up yesterday by the International Conference on Global Warming and Sustainable Development: An Agenda for the 90s.

Conference participants, over three days, broadly agreed that most of the heat-trapping gases causing global warming are emitted by industrialised nations and that they should take the lead in lowering their emission rates and in developing efficient and renewable technology to be made available to all.

The combustion of lignite, coal, oil and gas releases carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) into the atmosphere at higher rates than they are removed through natural processes. Deforestation also contributes significantly.

These two gases, although present in the atmosphere in low concentrations, absorb radiant heat and increase the temperature.

Recognised scientific evidence confirms temperature rises will continue indefinitely more rapidly than current projections. Urgent action is needed to stabilise the composition of the atmosphere as the first step towards stabilising the climate, the conference agreed.

It is estimated that \$20 billion to \$50 billion per year will be needed to stabilise the earth's climate. Additional resources of a similar magnitude will be needed to bring about sustainable development with the provision of funds requiring an "imaginative new mechanism."

Suggestions for the mechanism include the development of a system of carbon taxes, or other levies on global means to transport oil, airline passengers, or the like, and a system of tradeable emissions permits.

Major issues and recommendations include:

- Global warming and the irreversible loss of so-called renewable biological resources through rapid climate change can turn into crucial security issues.

It is critical that spending on traditional military security be curtailed so money is available for sustainable development.

Industrialised nations that produce weapons have an obligation to reduce their sale and distribution while developing nations have an obligation to reduce their military spending.

- Since the energy sector is the major source of "Greenhouse Effect" gases, economic development plans should emphasise efficient production and use of energy as an integral part of an overall strategy.

- Developing nations at the start of their industrialisation need not follow the development path of industrialised nations and therefore can avoid heavily contributing to the global climate change and local pollution.

Industrialised nations and international funding agencies have an obligation not to saddle developing nations with obsolete, inefficient, polluting technology but to make available appropriate technology.

- Developed countries and development agencies should make money available for developing countries to afford appropriate technology.

- Forests should be managed on the basis of sustainability since they play a critical role as absorbers of carbon and provide resources and biodiversity. Degraded forests should be rehabilitated.

- Debt reduction agreements which are linked with forest protection, reforestation, improvement of agricultural land and efficient energy investment should be developed.

- There should be more opportunities for global warming and sustainable development to be discussed at the national level, since the many key decisions are to be made by the heads of governments.

- Equitable allocation schemes and mechanisms for reducing the production of greenhouse gases should be developed so appropriate technology and economic

transition can be effected without undue burden being placed on nations with the least financial and other resources.

- A regional network of policy research institutions on global warming and sustainable development is needed.

### **Beijing Hosts Developing Countries Environment Conference**

*OW1406143191 Beijing XINHUA in English  
1130 GMT 14 Jun 91*

[Text] Beijing, June 14 (XINHUA)—The ministerial conference of developing countries on the environment and development, sponsored by the Chinese Government, opened here today.

Ministers and other high-ranking officials from 41 developing countries are attending the meeting, the first of its kind organized by Beijing since 1949, when the People's Republic was established.

According to the organizers the meeting is to promote South-South cooperation as well as North-South dialogue on environmental issues, thereby enhancing international cooperation.

"It will help to change the situation in which the voice of developing countries relating to world environment and development couldn't be fully heard and, particularly, their concrete problems and special conditions couldn't win full attention," said Li Xue, Chinese vice-minister of the State Science and Technology Commission.

Representatives from eight developed countries, including Britain, Japan and the United States, as well as from 13 international organizations are attending the six-day meeting.

Li, who is also chairman of the organization committee of the meeting, said it is certain to bring about positive results.

As part of the preparations for the United Nations 1992 Conference on the Environment and Development, he noted, this meeting is a contribution made by developing countries.

### **More on Third World Environment Conference in Beijing**

*HK1506045791 Beijing CHINA DAILY in English  
15 Jun 91 p 1*

[By staff reporter Zhou Jie]

[Text] Ministers from 41 developing countries, meeting in Beijing this weekend, are hoping to find a common Third World stance on how to tackle global environmental problems.

The Ministerial Conference of Developing Countries on Environment and Development, which began yesterday,

is likely to work out a Beijing Declaration when the talks end next Wednesday, according to Deng Nan, secretary of the conference.

Environmental deterioration, which is symbolized by the greenhouse effect, ozone depletion, wholesale environmental pollution and ecological destruction, has become a great threat to mankind and the planet.

However, disputes between countries on who should be responsible for the crisis have been heating up.

Industrialized countries complain that the Third World spews out too many lethal gases, but the developing nations blame the industrialized world for having loaded the atmosphere with gases in the past century.

The advanced countries have asked for a reduction in carbon dioxide, methane and chlorofluorocarbon (CFC) emissions within the next few years, which the Third World nations claim could be accomplished only with the developed world bearing much of the costs and providing the technology.

Deng said developing countries were going through the double pressure of environmental deterioration and economic development, and were suffering from lack of funds, large populations and old-fashioned technology.

Countries such as China have been hesitant to make a pledge on limiting carbon dioxide discharges, because coal-burning—the main cause of carbon dioxide—is still a major source of energy and a big part of their economic development.

The conference, following last April's meeting of developing countries in India, is part of the preparatory work for the 1992 United Nations Environment and Development Congress in Brazil.

#### **Singapore Official Wants Common ASEAN Stand on Environment**

*BK1706102291 Kuala Lumpur BERNAMA in English 0915 GMT 17 Jun 91*

[Text] Singapore, June 17 (BERNAMA)—An ASEAN common stand at next year's United Nations Conference on Environment and Development (UNCED) will safeguard the needs, interests and views of the grouping and help to stimulate global cooperation on the environment, it was stated here Monday.

Goh Chee Wee, chairman of the Government Parliamentary Committee (Environment), said "we should endeavour to demonstrate the region's ability to effectively safeguard its environment in spite of rapid economic development."

Opening the second meeting of ASEAN senior officials on the environment, he said that at the last ASEAN ministerial meeting on the environment held in Malaysia, the ASEAN environment ministers had agreed to adopt a common stand on UNCED issues.

The UNCED meeting, to be held in Brazil, would be one of the most important international forums ever held on the environment as the common future and the preservation of planet earth may very well depend on its outcome.

Besides the signing of two conventions on climate change and on the conservation of biological diversity, the outcome of the UNCED would include an "earth charter" to be declared by the world's heads of government.

The charter, which contains principles on environment and development, would signify a global commitment to sustainable development at the highest political level.

"While the world is in complete agreement that immediate solutions are needed, there is, however, a lack of consensus generally between the developed and developing countries on how these solutions can be implemented," he said.

He said that although welcomed by environmentalists, the outcome of the UNCED would have institutional and policy implications on individual countries.

For example, Goh said, the proposed conventions on climate change and biological diversity could affect the economic development of many countries including ASEAN.

"The impacts could be felt in many sectors of the economy such as the energy, transportation, manufacturing, forestry, and agricultural sectors," he said.

By working together, ASEAN could make a significant contribution to the UNCED process which aims to stimulate changes and actions to reverse the current decline in global environment.

#### **Nigerian Oil Minister, Venezuelan Counterpart on Oil, Environment**

*AB1406144891 Lagos Radio Nigeria Network in English 1800 GMT 12 Jun 91*

[Text] Nigeria has criticized Western propaganda on environmental hazards arising from oil exploration. The minister of petroleum resources, Professor Jibril Aminu, said OPEC had always identified itself with global ecological problems, but argued that to single out oil as the most hazardous was in bad taste. Professor Aminu was speaking with Dodan Barracks correspondents. He pointed out that Western nations have also produced energy from other sources with high potential for environmental hazards. The minister advised the Nigerian media to be wary of such Western campaigns because oil was the mainstay of the economies of OPEC countries.

Also commenting on the same issue, the OPEC president, Mr. Celestino Armas who was with Prof. Aminu, announced that the organization will soon appoint international experts to collect information on various sources of energy and the environment. Mr. Armas said

that after the exercise, OPEC will organize a seminar to analyze the scientific data on the real impact of the different sources of energy on the environment. Mr. Armas, who is also the Venezuelan oil minister, noted

that it had not been possible to arrange the summit of OPEC heads of state because of some political problems. He gave an assurance however that plans to arrange such a summit were still in the pipeline.

**Results of Environmental Poll Reported***91WN0470A Montreal LA PRESSE in French  
17 Apr 91 p C3*

[Article by Richard Dupaul: "Minority of Canadians Ready To Move Into Action To Protect Environment"]

[Text] "Everyone wants to go to heaven, but no one wants to die...." (Old saying).

Most Canadians are concerned about the effect of packaging on the environment and solutions such as recycling. However, as in the song, only a minority is willing to pay the price for ecologically-sound products, according to a Canadian Food Product Manufacturers (FCPA) poll.

The annual survey, whose results were unveiled at the FCPA general assembly in Montreal yesterday, indicates that 52 percent of those polled are interested in the ecological impact of packing. This marks a slight increase over last year's results (48 percent).

**Not Me**

And yet, many consumers hesitate when asked if they are willing to take concrete action to protect the environment, particularly in Quebec, where the level of commitment is the lowest in the country.

For example, a third of all Canadians (33 percent) say they are willing to take measures to save the environment, but that level drops to only 21 percent in Quebec, compared with 41 percent in British Columbia and Ontario.

In addition, only a little under a third of those responding (32 percent) are willing to pay more to obtain ecologically-sound products. The study does not show the provincial breakdown on this question.

FCPA president George Fleischmann could not explain the low interest of Quebecers in environmental questions. For their part, the 160 companies belonging to the FCPA are moving into action by reducing the weight of packaging, opting for "green" products, and supporting waste collection programs such as "Selective Collection" in Quebec.

The well-known economist Sylvia Ostry painted a gloomy picture of Canada's ability to carve out a place on the international scene.

A guest at the conference, Ostry said the Canadian economy is too heavily based on natural resources and depends too much on governments, while being the least productive of the Group of the Seven. Ostry said it is "urgent" to effect a shift, particularly in the fields of manpower training and business productivity.

**Group Criticizes Ottawa on Great Lakes Pollution***91WN0470B Montreal LA PRESSE in French  
4 May 91 p A5*

[Text] Deterioration of the water quality of the Great Lakes threatens the health of millions of persons, says a coalition of environmental groups that is accusing Ottawa of dragging its feet on its cleanup program.

"From Thunder Bay to Montreal, people depend on vast bodies of water that are all interconnected and pollution in one place affects all others," says Great Lakes United President John Jackson.

The coalition, representing some 180 Canadian and American groups, held a press conference in Ottawa yesterday at which it harshly criticized the Canadian Government.

"Ottawa is two years behind in its program to clean up 17 polluted sites on the Canadian shores of the Great Lakes," it charges.

According to Jackson, Canada has not abided by commitments it made in the Canada-United States Agreement on Water Quality of the Great Lakes, an agreement stipulating that "the prevailing philosophy regarding the dumping of toxic substances must be zero dumping."

"Scientists tell us very clearly that problems with pollution of the Great Lakes are serious and cumulative and have extremely harmful effects on all life in the Great Lakes Basin, nature, and human beings," he said.

**Bourassa Comments on Quebec Environmental Policy***91EN0638Z Montreal LA PRESSE in French  
27 May 91 p A4*

[Article by Andre Pepin: "Bourassa: We Must Defend the Environment Realistically"]

[Text] Prime Minister Robert Bourassa maintains that not only do Quebec's aluminum plants use the best technologies to reduce pollution by employing the most efficient methods in the world, but in the years ahead, they will also help to achieve a significant reduction in the amount of steel used in the automobile industry.

At the conclusion of his department's general council meeting this weekend in Laval, the prime minister said that protection of the environment must be closely linked with economic development. "Over the past two election campaigns, the environmental issue garnered far more attention than did the constitutional issue. We must protect the environment resolutely, but with realism."

Bourassa also said that a ministerial committee had been set up to enable the so-called "economic" ministries to meet with Environment to achieve better planning of industrial development.



Since February, deputy ministers have been meeting weekly to discuss future investments. Concerning SOLIGAZ in Montreal, Bourassa said the following: "The minister of environment will soon report to the cabinet in order to study possible solutions." We know this proposal from the petrochemical industry is now compromised by the Office of Public Hearings on the Environment.

Bourassa's staff is currently developing a new policy that will lead to an overall evaluation of environmental impact before even proposing a project, this for the purpose of preventing companies from being blamed and enduring cursory trials before any investment project is even proposed. For example, the Office of Prime Minister says, SOLIGAZ plans to sell natural gas in large volumes to supply automobiles in eastern Canada, reducing the amount of pollution considerably. This overall impact analysis practically does not exist with existing environmental legislation.

Speaking at a press conference, the prime minister was careful not to announce major modifications in the law on the environment, indicating only that "cases are studied by the Cabinet together with Pierre Paradis, head of the Ministry of Environment."

Another example of the importance of the law on the environment is that of a major company specializing in high technology and scheduled to announce a project costing tens of millions of dollars in the Montreal region in the weeks ahead, but awaiting a green light from the Ministry of Environment. Bourassa was unable to outline the nature of the project yesterday, preferring to await the conclusion of all agreements. Various projects have thus been delayed, causing Bourassa's staff to set up an important working team whose task it will be to reconcile environmental and economic objectives.

The prime minister said that various groups, particularly the PQ [Quebec Party] opposition, have often condemned the arrival of the aluminum plants, which "they say are energy guzzlers and polluters," even though they use state-of-the-art technologies and have created thousands of jobs. "They wondered about our sanity 20 years ago when we talked of developing James Bay. Today, our major natural resource allows us to create 2,500 jobs at Sept-Iles with the Alouette aluminum plant. Unemployed workers from Gaspesie who would have had to go to Algeria or Asia can now cross the river and make a very good living very close to home."

Bourassa, visibly in fine form, told Liberal activists that the recession is definitely over with and that a vigorous recovery has already been announced in the United States.

Finally, concerning the constitutional debate, the prime minister simply indicated in his speech that the government he heads has already completed all the preliminary phases for setting up a negotiating process, including

Law 150 on the referendum. He added that two parliamentary commissions would exist, one for prosovereignty forces and the other to study the offers of reform coming from Ottawa in the fall. "We are now learning (Sunday newspapers) that sovereignty will cost an estimated 15 billion. We already have problems with a deficit of 3 billion, so that they will surely allow me to make a thorough study of the issue," the prime minister concluded.

### Minister Presents Draft Law on Quebec Pollution

91EN0638Y Montreal LA PRESSE in French  
16 May 91 p A3

[Article by Frederic Tremblay: "Paradis Takes Up Lincoln Bill on Pollution"]

[Excerpt] Yesterday, Minister of Environment Pierre Paradis presented a bill to the National Assembly aimed at fighting industrial pollution in Quebec.

Bill 143 takes up where the matter was left three years ago by one of Paradis' predecessors, former Minister Clifford Lincoln.

By the year 2000, the bill would achieve a 75-percent reduction in the industrial waste of 600 plants in Quebec, plants which by themselves are responsible for 80 percent of all of Quebec's industrial pollution.

Paradis therefore hopes to succeed where his former colleague Clifford Lincoln failed, not only convincing his government to support the new law, but lending his support to regulations stemming from it, without which the new legislations totally loses its effect.

"The first priority of the minister of environment is to get the law presented to the National Assembly passed, unanimously, if possible," Paradis stressed at a press conference.

The minister, who claims to have obtained the support of the Cabinet for his bill, adds that "the regulations will be sent on to the Cabinet 30 days after the law is passed."

### Necessary Tools

"We have neglected the industrial and agricultural cleanup. The bill will give MENVIQ [Ministry of Environment of Quebec] the necessary legal tools to go after industrial pollution," Paradis said.

If the bill passes, one of its effects will be to impose heavier penalties on violators.

The fine for first offenders would be \$10,000 to \$25,000, but penalties for subsequent violations would be between \$20,000 and \$50,000.

The new legislation would also enable the minister of environment to issue an order requiring that a plant cease emitting any pollutant until it has filed an affidavit with MENVIQ.

At the same time, asked to comment on the case of the Tricil incinerator at Mercier, Paradis said his ministry had acted as promptly as it could, despite criticism from ecology circles.

"In the Tricil case, the MENVIQ staff was informed 45 days ago and went into action immediately. Search warrants were issued by the courts on Thursday of last week, the searches were conducted on Friday, and the investigation is underway," Paradis reported.

The minister said the investigation was being conducted by his "Green Police" and the Quebec Detective Division.

Hundreds of barrels and contaminated electrical equipment are reportedly buried near the incinerator, out of service for two years. They had been used to burn hydrocarbons and dangerous organic waste. [passage omitted]

#### **Quebec Minister on James Bay Environmental Study**

*91EN0638B Montreal LA PRESSE in French  
18 May 91 p F1*

[Article by Frederic Tremblay: "Grande-Baleine: Paradis Considering Overall Evaluation of Project"]

[Text] Minister of Environment Pierre Paradis has once again opened the door to an overall environmental evaluation of the Grande-Baleine Project, thus increasing the chances of more federal intervention.

Following a meeting Thursday evening with his new federal colleague Jean Charest and Inuk and Cree representatives, Paradis said he was willing to approach his

own government to verify the feasibility of such an environmental study, which would also include roads and infrastructures.

Sylvie Marier, press secretary to the environmental minister, told LA PRESSE CANADIENNE yesterday that Paradis would ask his colleague in the Justice Department, Gil Remillard, if it were possible from a strictly legal standpoint.

An opinion from the attorney general of Quebec dated 28 September stated that the environmental study for the Grande-Baleine Project "had to be" split up, meaning that there had to be a specific study for access roads to Grande-Baleine and another for the dams.

#### **Federal and Roads**

By opening the way to a possible overall study and thereby trying to satisfy Indian groups in particular, Paradis could indirectly allow Ottawa to have the right to oversee the environmental process as it pertains to roads.

Represented on the multipartite commission responsible for the environmental study of Grande-Baleine dams, the Federal Government could, via a broadening of the committee's mandate (in the case of an overall study), intervene in the matter of the roads.

"For Quebec, what is important is to retain its leadership," Marier explained in connection with the case in point.

However, she did add that it was unacceptable for Quebec to have the Federal Office of Environmental Studies conduct its own hearings on roads.

Last week, Paradis gave the green light to public hearings on the environmental evaluation of Grande-Baleine infrastructures (roads).

## Bureau Releases Report on National Environment in 1990

HK1006145191 Beijing RENMIN RIBAO in Chinese  
5 Jun 91 p 3

[Report: "State Environmental Protection Bureau Releases Communique on PRC Environment Situation in 1990"—passages within slantlines printed in bold-face]

The State Environmental Protection Bureau called a press conference on 30 May to issue the Communique on the PRC Environment Situation in 1990 based on Article 11 of the "PRC Environmental Protection Law."

Communique excerpts are as follows:

### I. Environmental Situations

**Air** Air pollution in China's large and medium cities was rather serious and was aggravated in small towns in 1990. The volume of exhausted air nationwide (excluding industry in townships and towns) was 8,500 billion standard cubic meters, up by 2.8 percent over the previous year. Of this, the volume of carbon dioxide discharged was 14.95 million tons, basically maintaining the 1989 level, and the volume of smog and dust discharged was 13.24 million tons and 7.81 million tons respectively, somewhat lower than the previous year.

In 1990, the amount of suspended particles was 387 micrograms/cubic meter in the urban areas on an average day and the amount of nitric oxide was 42 micrograms/cubic meter. Acid rain was limited to partial areas of China but tends to extend, with a rather serious situation in the Southwest and South China.

**Water** In 1990, the volume of waste water discharged (excluding industry in townships and towns) was 35.4 billion tons, of which industrial waste water discharged was 24.9 billion tons, down by 1.4 percent from the previous year, and the volume of waste water discharged from homes 10.5 billion tons, up by four percent. In industrial waste water, the volume of oxygen in chemical consumption was 7.08 million tons, up by 4.3 percent from the previous year; the volume of heavy metals discharged (mercury, cadmium, lead, and chromium with a valence of six) was 2,189 tons, up by 4.7 percent; the volume of arsenic discharged was 1,226 tons, down by 4.4 percent; the volume of cyanide discharged was 3,891 tons, down by 12.9 percent; the volume of volatile phenol discharged was 9,325 tons, up by 22.5 percent; and the volume of petroleum discharged was 66,560 tons, down by 6.3 percent.

The quality of water in the Chang Jiang's main stream was generally sound in 1990; however, areas polluted to various degrees were found in the cities' drainage periphery along its banks for various lengths. Water quality along the main stream of the Huang He valleys was sound, with no remarkable changes compared with the previous year. Water quality in Zhu Jiang's upper reaches was fine, but the Guangzhou and Liu Jiang's

Liuzhou section were seriously polluted. Pollution in the Liao He was the most serious in the seven major rivers in the country, continuing to develop.

In assessing 94 city sections on rivers, 65 of them were polluted to various degrees, accounting for 69.1 percent. Major pollutants were ammonia, nitrogen, volatile phenol, and oxygen consuming organisms.

Water quality in most sea areas in China was sound, whereas the quality of coastal waters and sea areas close to river estuaries and bays was comparatively poor. Pollutants far exceeding standards in coastal waters were mainly nutritive saline and petroleum. Petroleum content in various coastal waters universally increased, the most seriously polluted being in the following order: The Bo Hai, Nan Hai, and Dong Hai. Occurrences of red tide resulting from conspicuous excessive nutrients were frequent, with the areas extending. There were 34 such incidents in 1990, up by 22 on the previous year.

**Urban noise pollution** Regarding the causes of urban noise pollution, traffic accounted for 32.7 percent, domestic noise for 40.6 percent, and noise pollution derived from industry and other aspects 26.7 percent. Compared with the previous year, the proportion of domestic noise pollution rose by 6.8 percent, traffic noise pollution dropped by 6.6 percent, and noise pollution derived from industry and other aspects dropped by 1.1 percent. Urban noise pollution in all areas remained above standard and took on a rising trend.

**Industrial solid residues** The volume of industrial solid residues nationwide (excluding industry in townships and towns) was 580 million tons, up by 1.1 percent on the previous year; the volume of industrial solid residues discharged was 500,000 tons, a 9.5 percent drop from the previous year; and the cumulative volume of piling industrial solid residues was 6.48 billion tons, covering an area of 875,850 mu, an increase of 44,790 mu from the previous year. Of this, 60,600 mu was arable land, up by 6,990 mu on the previous year.

**Accidents due to pollution** In 1990, 3,462 pollution accidents took place nationwide, up by 3.9 percent on the previous year.

**Forests and grassland** In 1990, the nation's volume of forest resource consumption dropped by 20 million cubic feet, with volume of forest growth exceeding that of consumption in half of the nation's provinces and autonomous regions. However, shortages in forest resources were not eased. China suffers serious retrogradation in its grasslands and the tendency toward an ever-reducing grass output has not been changed.

**Land** The area of land suffering from soil erosion was 2.25 billion mu, accounting for 15.6 percent of the nation's territory. Marked soil erosion was found on one-third of the arable land.

Last year saw an easing of the shrinkage of farmland area. However, the issue of deteriorating soil quality



stood out with each passing day. Pollution resulting from chemical substances, the effects of pesticides, chemical fertilizers, and plastic film on the quality of the agricultural ecological environment made itself felt.

**Biological species** China has multiple varieties of biological species, boasting some 30,000 species of advanced plants and over 2,300 varieties of vertebrates on land. The destruction of the natural ecological environment, such as the forests and grasslands, has endangered some animals, plants, and advanced fungi. Distributive areas of a considerable number of species (or subspecies) such as wild camels, white-fin dolphins, wild elephants, slope deer [po lu 0980 7773], snub-nosed monkeys, pandas, and Manchurian and South China tigers have been markedly narrowed, with a sharp decrease in the numbers in their groups. There are now 312 varieties and categories of rare biological species peculiar to China and precious or endangered wild animals listed for state key protection. Some 640 species and varieties of China's wild animals are involved in the list of endangered wild animals prohibited or restricted in trade, stipulated in the "International Convention on Prohibiting Trade in Endangered Wild Animal and Plant Species." The first batch of plants listed in the state catalog of endangered plants numbers 345.

**Climatic changes** Winter has become markedly warmer in the northern part of China over the past 10 years, with an average temperature of 0.1-1 degree Centigrade higher than it was 30 years ago. In most parts of the northeast, Nei Mongol, and the northern parts of Xinjiang, it is 1-3 degrees Centigrade higher. Such changes have affected social, economic, and environmental aspects in those areas.

## II. Work Regarding Environmental Protection

**Control and improvement of environmental pollution** The rate of removing smoke and dust from waste air from fuel combustion was 74 percent in 1990, up by 3.9 percent from the previous year. The industrial exhaust air purifying processing rate was 62 percent, up by 4.7 percent. The boiler-transforming rate rose to 69.7 percent from 67.2 percent the previous year; industrial kiln transformation rate rose to 48.1 percent from 44.4 percent. Industrial waste water processing rate rose to 32.2 percent from 29.9 percent the previous year, with the standardization rate maintained at the 1989 level. The volume of processed industrial solid residue was 370 million tons, up by 1.3 percent over the previous year, and the volume of recycled residue was 170 million tons, up by five percent. Urban garbage and night soil processing rate was 2.3 percent. Seventeen provinces, autonomous regions and municipalities have completed their radioactive waste processing centers, of which 12 are in operation. Urban gasification rate was 42.2 percent, of which large cities accounted for 54 percent. The popularization rate of urban central heating went up to 5.3 percent.

**Ecological environmental protection** In 1990, the area of afforestation completed was 82.95 million mu and the cumulative total preserved area of artificial afforestation amounted to 460.05 million mu. The year also saw additional artificial and improved pastures on 82.95 million mu and enclosed pastures covering 43.2 million mu, with grass seed preserved on 4.98 million mu. Pests and rats were eliminated on a cumulative area of 275.55 million mu.

The cumulative area on which soil erosion was improved accounted for some 79.5 million mu; initial improvement was made on 255 million mu on which waterlogging was liable to occur, 60 million mu with saline-alkali soil, and 30 million mu with red and yellow soil; and the building of 495 million mu of farmland with high and steady output was completed. The number of ecological farming bases increased to 900.

In 1990, the State Council approved the setting up of five additional natural conservation areas bring the total number of such areas at the national level to 61. Xinjiang's Bogda Feng and Hubei's Shengnonjia Natural Conservation areas have become part of the world human and biological natural protection network. The state has set up a number of precious, rare, and endangered animal species training and breeding centers.

**Intensifying environmental control** In 1990, the State Council promulgated the "Decision on Further Augmenting Work Concerning Environmental Protection," "Regulations on Prevention, Cure, and Control of Pollutants From Land Contaminating PRC Oceanic Environments," and "Regulations on Prevention, Cure and Control of Coastal Projects Contaminating PRC Oceanic Environments." China promulgated 16 additional national environmental criteria in 1990, bringing the total of such criteria to 204.

In 1990, the State Planning Commission and State Environmental Protection Administration jointly assigned 140 second-batch projects to deal with environmental pollution with a deadline; responsible departments issued licenses for discharging polluted water to 2,436 major sewage projects in 107 cities. The State Oceanography Bureau issued 88 licenses for dumping residue into the sea; the state collected a total of 1.74 billion yuan for discharging wastes, up by 70 million yuan, or 4.2 percent, from the previous year.

## Equal Stress Laid on Development, Environmental Protection

OW1006223991 Beijing XINHUA in English  
0939 GMT 10 Jun 91

[Text] Beijing, June 10 (XINHUA)—Vice Minister of Energy Lu Youmei pledged that China will not follow the road of economic development-pollution-treatment, which has been taken by many developed countries.

Instead, Lu said, the country will place equal emphasis on both economic development and environmental protection, the OVERSEAS EDITION of the PEOPLE'S DAILY reported today.

The country will give priority to measures that reduce pollution when it draws up future development plans, he said.

The country will also encourage people to save energy, readjust the energy production structure and control population growth in order to reduce overall energy consumption.

In addition, efforts will be made to tap new energy sources, including solar, wind and terrestrial heat power sources, develop gas and marine energy and put new nuclear energy technology in practice.

Lu said that the per capita consumption of energy in China is one third of the world average.

#### **Impact of Chinese Population on Environment Analyzed**

91WN0421A Beijing ZHONGGUO HUANJING BAO [CHINA ENVIRONMENTAL NEWS] in Chinese 4 Apr 91 p 3

[Article by Qu Geping [2575 2706 1627] and Li Jinchang [2621 6855 2490]: "Environmental Impact of Modern China's Population and Coordination Countermeasures"]

[Text] Modern China's population characteristics are a large initial base number, powerful growth inertia, poor quality structure, and serious potential threat. This is extremely rare in the world. The enormous demand of China's population for food, clothing, and other basic conditions of existence is converted into heavy pressures on land, fresh water, and other agricultural resources. Satisfying this large demand for industrial products for life has led to excessive development of mineral deposits, forests, prairies, the sea, and other environmental resources. The low-quality population structure also has reduced the effectiveness of a series of policies to readjust the relationship between our population and the environment. Thus, although the population factor is not the only factor that created China's environmental problems and resource problems, it is certainly an ultimate root that cannot be ignored.

#### **I. Environmental Impact of Modern China's Population**

##### **A. Impact of the population on the land**

The Chinese continent covers a total area of 9.6 million square kilometers, making it one of the world's nations with the largest continental area. Under existing technical and economic conditions, about 6.27 million square kilometers of our land area can be used for agriculture, forestry, and fishery and for urban and rural construction, equal to 65 percent of our total land area. The other slightly over one-third of our land is very

hard-to-utilize desert, gobi, glaciers, stone mountains, high frigid wilderness, and so on. Cultivated land also accounts for a very small proportion, 14 percent or about 135 million hectares, of our land that can be used for agriculture. Moreover, because China has a relatively long history of agricultural development and land utilization, most of our land resources have already been developed and we have inadequate cultivated land resource reserves (barren land suitable for agriculture), only about 500 million mu, less than 2 percent of the world's non-reclaimed land suitable for agriculture. Most of it is located in northeast and northwest China and is mostly frontier land with rather poor cultivation conditions. It is apparent that China's cultivated land situation is not a cause for optimism. Moreover, rapid population growth has made this situation even more serious.

First, the direct result of population growth is that the per capita cultivated land area has become increasingly smaller. In 1949, shortly after the founding of the People's Republic of China, the national average per capita cultivated land was 2.71 mu. Because of major efforts by the state to develop agriculture and reclaim barren land, China's cultivated land had increased to 1.62 billion mu by 1952, a per capita average of 2.8 mu. Although this was about one-half the world per capita average of cultivated land at that time, 5.5 mu, it was the highest level in China over the past 40 years. Forty years later, in 1988, China's population had grown to 1.096 billion and our cultivated land area had been reduced to 1.479 billion mu, a per capita average of just 1.35 mu of cultivated land. Over a 40-year period, our per capita cultivated land area was reduced by 50 percent, mainly due to population growth. The per capita cultivated land area in one-third of China's provinces and autonomous regions now is less than 1 mu. Now, 1 hectare of cultivated land in China supports a population of 11 people, far higher than the world average level. By the end of this century, China's total population will reach 1.25 to 1.3 billion, but the trend toward reductions in cultivated land will continue. At that time, per capita cultivated land will have dropped to about 1.1 mu, so each hectare of cultivated land will have to support 14 people. The pressure of the population on the land will become even heavier.

Second, the pressure from population growth on demand for agricultural products has forced the peasants to use cultivated land intensively and led to increasingly severe pollution and deterioration of cultivated land. In a situation of a growing population and shrinking cultivated land, grain output must be increased to ensure that people have enough to eat. The main ways to increase grain output at present are using large amounts of chemical fertilizer and farm chemicals, reclaiming land poorly suited to cultivation, and so on. Undoubtedly, the use of chemical fertilizer and farm chemicals have brought about a revolution in agricultural production, but pollution of the soil and destruction of the soil structure have caused fertility declines. All of China's

cultivated land is now polluted by chemical fertilizer and farm chemicals to varying degrees.

Third, rapid growth of our urban population and the rapid expansion of industry, communication, and transport have consumed large amounts of cultivated land. The houses, communication, and so on for our large additional population all require the occupation of land and the greatest probability is that cultivated land will be taken over. In China, there are three main ways in which cultivated land is taken over: 1) Rapid expansion of cities and the occupation of large amounts of cultivated land in city suburbs. In Beijing Municipality alone, for example, about 400 square kilometers is now being used for structures each year; 2) Scattered village structures have swallowed up large amounts of cultivated land. Surveys show that from 1978 to 1981, a total of 1.5 billion square meters of new houses were built in China's rural areas and many villages have taken on an entirely new look. Still, behind this flourishing landscape there is a heavy cost from the sacrifice of cultivated land. In one county in Zhejiang Province, 7,900 mu of cultivated land was consumed in just one year; 3) All sorts of excavation activities have destroyed many excellent fields and the "gold panning fever" that has appeared in the past few years has further enhanced the tide of encroachment upon cultivated land. Statistics show that these three things have taken over more than 21.70 million mu of cultivated land over the past few years, which is equivalent to a reduction in our cultivated land area the size of Fujian Province.

Rapid population growth is already placing heavy pressures on China's land resources, particularly cultivated land. Reductions in our cultivated land resources and the declining quality of some of our cultivated land have become an extremely negative factors in China's grain production and economic development.

#### B. Impact of population on forests

Historically, China has been a nation with rich forest resources, but generations of cutting and destruction have turned China into a forest-impooverished country. Our present forest coverage is just 12.98 percent and we have about 9.14 billion cubic meters of forest reserves, less than 9 cubic meters per person. Although the forested area has increased over the past decade, there have still been relatively severe reductions in our forest reserves and large-scale encroachment on forests.

China's excessive population has created enormous demand for timber, both from demand for products made from wood and from demand for firewood as a household energy resource. This demand has been converted into large-scale cutting of forest resources. Statistics show in China's 140 forestry bureaus, 61 bureaus are already in an excessive cutting state and forest resources have been exhausted in 25 bureaus. There are substantial shortages now of supplies for material, firewood, pulp, and other products of the forestry economy in China. Modernization and construction and improvements in

the people's living standards will further increase demand for wood and forestry sideline products and exacerbate the contradiction between supply and demand.

At the same time, increased demand for food and cultivated land from our growing population has intensified the pace of forest destruction and reclamation.

#### C. Impact of population on prairies

North China's grasslands cover an area of more than 310 million hectares, equal to 32.6 percent of our total territorial area. This includes over 220 million hectares of useable area. Overall, the ecological conditions of China's prairies are rather poor and less than one-fifth of all of our grasslands are rich pastures, while two-fifths are inferior grade pastures. Prairie productivity and load-carrying capacities are rather low.

After the establishment of the People's Republic of China, there were rather substantial improvements in the living conditions and medical conditions of minority nationalities in pastoral regions and the population of pastoralists grew substantially. To meet the food needs of this growing population, they expanded reserve land resources by reclaiming the rich northeast China prairie regions. There was also a considerable increase in the agricultural population of these regions which, when added to increases in the industrial and mining population (of which net population in-migration accounted for the largest proportion), the population density of these regions has grown rather quickly and the phenomenon of grasslands deterioration is becoming increasingly serious.

Over-grazing began occurring rather early. In the 1950's and 1960's, as the pastoral population grew, there was also a rapid increase in the carrying capacity of north China's grasslands and serious over-grazing had already occurred in many regions by the 1960's and 1970's. Over-grazing is now quite common in China's Inner Mongolia, Xinjiang, Qinghai, and other large pastoral regions. Because of over-grazing and other reasons, average grass output from north China's 220 million hectares of useable grasslands has fallen 30 to 50 percent over the past 15 years. It has fallen 40 to 60 percent in Inner Mongolia. Large areas of formerly lush prairies with plenty of water have been turned into exposed and semi-exposed desert and desert prairie.

Large-scale excessive land reclamation also began rather early. Since the 1950's, large agricultural populations have migrated to the prairies and edges of deserts in northwest China's provinces and autonomous regions and undertaken land reclamation activities on a unprecedented scale. Although they have made many achievements in developing irrigation, opening up farmland, and building new oases, they have also paid a bitter price in the spread of desertification and expansion of induced soil salination. Desertification has appeared in prairie regions of north China from the most eastern points to the most western points, and it is even more severe at the

edges of deserts and in interlocking agricultural and pastoral areas. Inner Mongolia's Ulanboi Desert had saccasoul forests covering an area of 2,000 square kilometers in 1964. Due to large-scale land reclamation by production and construction corps, the saccasoul forest was completely cut down over the past 10-plus years and the result is that consolidated and semi-consolidated sand dunes have spread to form a large desert, swallowed up the farmland that had been reclaimed, and encroached on pastures, extending up to the banks of the Huang He. Statistics indicate that over 3 million hectares of land in many of China's provinces and autonomous regions must immediately be taken out of cultivation and allowed to revert to pasture because of the ecological destruction caused by reclamation of pastures.

The ultimate outcome from excessive grazing and reclamation is desertification of grasslands. Because of the combined effects of these two things, the area that has been converted to desert over the past 30-plus years exceeds the total area of desertification prior to this. There has been long-term desertification of 120,000 square kilometers of land in China, of which 65,000 square kilometers was converted to desert between 1949 and 1980. It is a problem in 207 counties in 11 provinces and autonomous regions of northeast, north, and northwest China. Desertification is now occurring on an additional 158,000 square kilometers of land at the present time and about 1,560 square kilometers becomes desert each year. China's desert experts warn that if we fail to adopt effective measures, 80,000 square kilometers of land will become desert by the end of this century.

Because prairie deterioration and desertification are directly related to growth of the agricultural and pastoral population, controlling population growth, reducing the agricultural and pastoral population, and making changes in the industrial structure of the population are important measures for resolving the ecological crisis on our prairies.

#### D. Impact of the population on energy resources

China is one of the world's richer nations in energy resource reserves. We lead the world in coal and hydropower resource reserves with 280 billion tons of industrial coal reserves (1987) and 4,500 billion tons in total projected resources, about the same as the United States and Soviet Union. We have 676,000MW in theoretical hydropower resources, of which 378,000MW can be developed and utilized. Total annual power output could be as high as 1,920 billion kWh, first place in the world (1980). We also have very abundant petroleum and nuclear energy resources. We have continental petroliferous sedimentary basins covering an area of about 3.20 million square kilometers and offshore petroliferous basins covering an area of about 1.40 million square kilometers, and we hold eighth place in the world in industrial petroleum reserves. We also have rather abundant reserves of solar energy, sea energy, wind energy, geothermal energy, bioenergy, and other

renewable energy resources. Because of our large population, however, per capita energy resource reserves are very low. Rough estimates indicate that our per capita exploitable energy resources are about 50 percent of the world per capita average.

After the founding of the People's Republic of China, energy resource production and consumption in China grew very quickly. In 1988, total production of commodity energy resources was 950 million tons of standard coal (if we include straw, firewood, animal manure, and other non-commodity energy resources burned each year that are equivalent to more than 200 million tons of standard coal, total consumption has surpassed 1.1 billion tons of standard coal). We have also made great advances in the area of developing new energy resources and renewable energy resources. Since the early 1980's, the structure of energy resource production and consumption has been basically stable and unchanging. China has become a major energy resource producing and consuming nation where coal is the dominant source and non-commodity bioenergy consumption is also very substantial.

During this period, there has been a significant increase in per capita production and consumption of commodity energy resources, but we are still very low compared to various nations in the world. Because of rapid population growth, widespread establishment of high energy consuming industries, and energy resource prices which have been held at very low levels for a long period, there has been a shortage of energy resource production and supplies in China for a long time. Various forecasts indicate that in the 1990's and early part of the next century, there will be a tendency toward more intense contradictions between energy resource supply and demand and there will be even more troubling effects on the environment caused by energy resource production.

A major cause of this energy resource predicament is growth of per capita household consumption of energy resources in China. First, population growth has directly increased demand for energy resources and increased pressures on the environment (mainly the atmospheric environment). If our total population reaches 1.3 billion by the early part of the next century, this would mean an increase of about 200 million over present levels. Calculating at per capita energy consumption for relatively prosperous living standards, we will require additional supplies of 300 to 320 million tons of standard coal which, when added to rising energy consumption levels for the original population, would greatly exceed our predicted production and supply capacity. At the same time, consumption of energy resources which continues to grow each year in combination with an energy resource structure dominated by coal has the potential for huge environmental pressures which would not be favorable to reducing China's present severe air pollution from coal smoke and would further increase discharges of sulfur dioxide, nitrous oxides, carbon dioxide, and other toxic gases.



Second, rapid population growth hinders progress in replacing inferior energy resources with superior energy resources (clean, high heat value) and expands the environmental impact of energy resource utilization. This is even more apparent in the realm of household energy use. In a situation of long-term shortages of energy resources, there is often no room for selecting superior quality energy resources and energy consumers are forced to use low heat value "dirty" energy resources. For example, because our urban population has grown too quickly, most of China's cities have been unable to popularize coal gas, a relatively clean and convenient household energy source, and centralized heat supplies have been restricted to specific regions. Most residents burn loose coal directly at many points over a wide area, which creates severe pollution of the lower atmosphere and directly endangers the physical health of urban residents. In another example, China has a vast rural population and rapid population growth, so total household energy use is very large. Calculating at a per capita figure of 0.40 tons of standard coal, total demand each year is more than 300 million tons of standard coal. In a situation of a commodity energy resource supply predicament, rural residents must rely on straw, firewood, animal manure, and other noncommodity energy resources as their main source of energy. The result is that much organic matter cannot be returned to the fields. Farmland fertility has declined, vegetation is destroyed, and there is great damage to the rural ecological environment.

In summary, if population pressures are not reduced, China will find it difficult to solve the energy resource and environmental problems it faces.

#### E. Impact of the population on mineral resources

China has a rather full complement of varieties of mineral resources. We have discovered over 150 types of useful minerals and have substantial proven reserves of more than 130 types. We are among the world's leaders in reserves of many types of minerals like tungsten, antimony, rare earths, zinc, and so on. Because of our vast population, however, the resources available per capita are very small. The amounts available per capita for 35 primary types of minerals are only about 60 percent of world average levels.

China's mineral extraction and processing industry has developed rapidly since the founding of the People's Republic of China and output of many types of mineral raw materials and processed products has grown quickly. There have also been substantial increases in per capita consumption of various primary minerals. China is now in the beginning stages of the middle phase of industrialization and the momentum of growing mineral consumption will continue to increase. Industrial growth combined with population growth has created great pressures on mineral resources and engendered several resource and environmental problems.

In the developed nations, there is no obvious relationship between population changes and changes in mineral resource consumption. China is different. Population growth has had a major impact on growth in the consumption of mineral resources. A substantial proportion of our mineral products and processing industry products are used to meet the needs of our growing population. Rough estimates of the intensity of consumption during the mid-1980's indicate that to satisfy the demand from an additional population of 100 million from 1980 to 1988, each year we are now consuming an additional 7.8 million tons of steel, 200,000 tons of nonferrous metals, and 21 million tons of cement. Considering increases in per capita consumption levels, one can expect that population growth will have a major impact on consumption of mineral resources. Obviously, China must expand the extraction and processing of minerals and expand imports to satisfy this ever-increasing demand. Although in an overall sense China's mineral resources can guarantee our production requirements during this century and the early part of the next century, excessive exhaustion of our mineral deposit reserves will directly restrict future development potential. In addition, we cannot ignore the ecological and environmental impact created by extraction and processing of minerals. All sorts of data show that departments engaged in extraction and processing of nonferrous metals, construction materials, and other minerals are major "producers" of waste water, waste gas, and industrial residues (including raw ore) and major polluters of the water, air, and land.

China has had a serious problem with indiscriminate mining of mineral deposits by peasants for several years. This is a direct shock on the natural environment by our large excess population in rural areas. Precious mineral resources are being seriously wasted by backward extraction and processing technologies, indiscriminate extraction and excavation, and small mines and small plant sites, and there has been severe damage to the surrounding ecological environment. If we fail to effectively guide local peasants in another direction of management, it will be hard to achieve a basic solution to the problem. This is another alarm bell for society from excessive growth of our rural population. Forecasts indicate that the 1990's will be a period of rapidly growing demand for mineral products in China, so guaranteeing effective supplies of mineral resources, increasing extraction and utilization rates, and reducing environmental damage from extraction and utilization are one of the basic conditions for achieving China's long-term development strategies.

#### F. Impact of the population on water resources

The Chinese continent has about 2.8 trillion cubic meters of water resources, sixth place in the world. Although we have considerable total water resources, they are rather difficult to use because they are unevenly distributed regionally and over time. Thus, for useable water resources, China is not rich in total amounts.

Available per capita water resources are only 2,700 cubic meters, far lower than the average world level.

Our huge population has profound effects on water resources that are manifested primarily in these areas:

1. The rapid increase in the size of our population has exacerbated the shortage of water resources. China's population has doubled since 1949, which is the same as halving the amount of water resources available per capita. During the same period, there was also a rapid increase in water used for production and life and widespread water shortages gradually appeared. Of China's 434 organizational system cities, 188 cities have water shortages and 40 cities have severe water shortages. Some cities have reached the point where they are forced to supply water at fixed times and in fixed amounts each day. China's daily urban water shortage exceeds 20 million tons, which includes an industrial water shortage of 12 million tons that affects over 20 billion yuan in industrial value of output each year. In China's rural areas, 40 million people and 30 million head of livestock have drinking water problems and 300 million mu of cultivated land is threatened by drought. According to forecasts, industrial and urban household water use in China will increase to 120 billion cubic meters by the year 2000, a net increase of 63 billion cubic meters. Agricultural water use will increase to 490 to 520 billion cubic meters, a net increase of 70 to 90 billion cubic meters. At that time, the total amount of water used in China will reach 610 to 640 billion cubic meters, equal to about 23 percent of our available water resources.

2. The rapid increase in population has to a certain extent reduced total water resources. First, the greater need for cultivated land due to population growth has resulted in "enclosing lakes to make fields" and destroyed surface water resources. Second, population growth has resulted in excess extraction of groundwater and reduced total reserves of groundwater. Excess extraction of groundwater has caused the water table to fall in some cities and there has been encroachment of seawater in several coastal cities which has affected the quality of groundwater.

3. Economic activities have severely polluted bodies of water. Providing employment for a large population has markedly increased the industrial pollution load and household pollution load. In 1988, China discharged 36.8 billion tons of waste water, including 26.8 billion tons of industrial waste water. Most of it was directly or indirectly discharged untreated into bodies of water. Monitoring of 532 rivers shows that 436 of them are polluted to varying degrees. In sections of our seven largest rivers which flow through 15 of our main cities, 13 sections have severely polluted water quality. The amount of industrial waste water discharges and highest concentrations of primary pollutants both appear around urban rivers with the highest population concentrations. The groundwater situation is similar. Groundwater in most cities has been polluted to varying degrees

and the hardness of groundwater in northern cities has increased every year. Severe water pollution has increased our shortage of water resources which were not that plentiful in the first place.

#### G. Impact of the population on the living environment

Man's living environment includes three aspects: material living standards, cultural living standards, and natural environmental conditions. Population has direct or indirect impacts on all three areas.

1. Rapid population growth has affected improvements in material standards. Since 1949, China's national economy and all sectors of industry have developed considerably, but overly-rapid population growth has caused a substantial portion of national economic growth to be consumed by the additional population. In 1988, China's national income reached 1.177 trillion yuan, a 20-fold increase over 1952. In per capita terms, however, the increase was only a factor of 10.4. In 1988 total consumption funds in China reached 797.1 billion yuan, a 16.7-fold increase over 1952, but because of overly-rapid population growth, per capita consumption increased by a factor of only 8.7. Research indicates that 58 percent of additional new consumption in China each year is used to meet the needs of our growing population and 52 percent of our increased grain output each year is used for our additional population.

2. Rapid population growth affects improvements in cultural living standards. The material life of our large population consumes most of our national income, so there are no strengths left for science, culture, education, and other activities, which directly affects improvements in people's material lives.

3. Rapid population growth has lowered natural environmental conditions and quality. Overly concentrated urban populations are causing increasing degradation of environmental quality. China's cities now have very serious air, water, and noise pollution. Measurements indicate that total suspended particulates in northern Chinese cities are 800  $\mu\text{g}/\text{standard cubic meter}$  and exceed 1,000  $\mu\text{g}/\text{standard cubic meter}$  in several cities during the winter. Rivers which flow through cities are all polluted to varying degrees. Cities have very severe traffic noise and regional noise. In rural areas, overly-rapid population growth has created powerful pressures to provide employment for the surplus labor force. In this situation, township and town enterprises have become an important way to solve employment problems. Township and town industry has certainly played an active role in development of the rural economy but the backwardness of their basic facilities, rather poor technical conditions, and extremely serious waste of resources and energy have caused severe environmental pollution and ecological destruction and affected the living environment in rural areas.

#### H. Population density and environmental load

China's population is unevenly distributed. East and south China, which comprise 43 percent of our land area, support 91 percent of China's total population and their population density is very high.

According to 1985 data, waste water discharged in east and south China accounts for 94 percent of the total amount discharged in China, and the region accounts for 88 percent of sulfur dioxide and 90 percent of particulates. This means that less than one-half of our territorial area bears over 90 percent of China's pollution load, which is identical to the population distribution, showing that there is a definite interrelationship between population density and the degree of pollution. Natural conditions in east and south China are rather good and suitable for human life. The population there has concentrated and developed for a long time and the economy is relatively developed, so there is also a rather substantial environmental impact. A very dense population affects the environment through highly intense economic activity.

## **II. Ideas for Countermeasures To Further Coordinate the Relationship Between China's Population and the Environment**

To control rapid population increase and the momentum of environmental degradation, China began implementing active and resolute population policies and environmental policies during the 1970's. Since the beginning of the 1980's, major changes have occurred in China's socioeconomic development strategy and we have gradually shifted from the single-minded pursuit of high rates of increased output onto the track of achieving sustained, stable, and coordinated development. We have also clearly announced that "birth control" and "environmental protection" are two basic national policies in China. This was the result of summarizing and rethinking the many defects and shortcomings in our traditional development strategy of the previous 30 years. It was also the result of a deeper understanding of China's population, environment, resources, and other basic national conditions. However, China's population problem, environmental problem, and so on took shape over a long period, so although China has expended arduous efforts in the area of coordinating development since the 1980's began, many problems still exist. Looking toward the 1990's and even further into the future, there are broad development prospects, but we will still face a difficult situation in the area of our basic national conditions.

Because of many restrictions by national conditions, China's development must follow a non-traditional model that is adapted to our national conditions. From the perspective of greater coordination of the relationship between China's population and environment, we can consider these countermeasures:

A. Establish an overall development strategy of sustained development

China has already decided upon development strategies in the areas of population, the environment, resources, the economy, science and technology, society, and all other areas and we have carried out overall coordination to a substantial degree. However, because of shortages in all of the areas mentioned above in China, each of them substantially restricts the other factors and there is very little room for manoeuvre for each strategy. Thus, it is extremely necessary that we establish an overall development strategy which takes into consideration all factors together.

This overall development strategy should be the ideology of "sustained development", meaning that like other nations of the world, China must develop and can develop. With the prerequisite that this development not damage the development foundation of future generations, we should strive to meet the needs of the current generation. Economic development in China is a long-term process. For developing and using natural resources, we must take into account the long-term needs of population growth and the long-term load-bearing capacity of natural resources and the ecological environment, and we must benefit population control and environmental protection. At the same time, a primary goal in population control and environmental protection should be to guarantee and promote long-term development of the economy. It should not mean "population for the sake of population" and "the environment for the sake of the environment". In summary, for China, where all of our national conditions are rather weak, sustained development is the only choice.

This sort of overall development strategy negates the development model of noninterference in population, waste of resources, leading consumption, low results, unfair allocation, stagnant education, sealing off the nation, environmental pollution, and backward management. From the perspective of China's long-term development prospects, establishing and implementing this sort of overall strategy is appropriate and feasible.

B. Further perfect a population policy system with Chinese characteristics

China's strict population control policies achievements have attracted world attention. This accomplishment is important not only for China but for the world as well. The problem now is that China's population policies were formulated and implemented to deal with the urgent situation of explosive population growth during the modern era. After nearly 20 years, several problems have been revealed and we now face two difficult choices:

One is the contradiction between "braking" population growth and rapid aging of our population structure. In a situation of an abrupt decrease in population growth, within 20 to 30 years the population will have fewer young people and a larger population of elderly people.

The second is the contradiction between state macro control indices and the reproductive wishes of the

masses. Two children per couple better suits the desires of the masses so there have been definite problems in carrying out the "shift to a single child" in rural areas and the phenomenon of excess births is relatively widespread (the total birth rate in rural areas is about 2.6 at present).

The third is the contradiction between declining birth rates of the urban population which has better cultural qualities and educational conditions (the single child rate in urban areas was 84 percent in 1988) and the persistently higher birth rates of the rural population which is of poorer quality. This sort of situation is extremely unfavorable to "reverse elimination" of population quality and to China's future economic development, resource utilization, and environmental protection.

In summary, as China's population and other national conditions change, population policies require further perfection to give them Chinese characteristics. From the perspective of the relationship between China's population and environment, consideration can be given to these measures:

1. Continued strict control of population growth. This strategic ideology must be unwaveringly and resolutely adhered to for a long time. A situation of nonintervention cannot be allowed to reappear. This is also true when zero population growth and reductions occur within the new several decades. We must always view population control as a basic condition for solving all of China's other problems. For example, if our population is not controlled, China's environmental problems cannot be basically solved.

2. Maintain the long-term nature and continuity of population policies, avoid major fluctuations. Major errors in past population policies caused a population crisis in China. Adoption of tight population policies now is essential, but when they are implemented we must pay attention to focal points and strengths. The main problem now in implementing China's birth control policies is not that the single child rate is too low. Instead, it is our failure to control multiple births (three and more births) and a certain amount of "loss of control" has appeared in recent years. Thus, while continuing now and into the future to work hard to advocate that each couple should have only one child, we must concentrate our efforts on preventing multiple births.

3. Quickly implement population legislation. Birth control is a basic national policy, so we should formulate the corresponding laws.

4. Use scientific and technical progress to improve the relationship between the population and the environment. The resource development and utilization process is the intermediate link between population and the environment. S&T levels are the indicator to use for evaluating the efficiency and benefits of this development and utilization. The sharp conflict between China's population and environment is manifested as heavy

population pressure that will be hard to solve quickly through scientific and technical progress, so they continually play a role in restricting natural resources and the ecological environment. Thus, China's population policy should not be understood as simply controlling excessive population growth and increasing the number of people receiving an education. Instead, it should be focused more on actively developing the enormous intellectual resources contained in our huge population and fully fostering our nation's creative consciousness and creative skills to promote S&T progress and increase mankind's capacity to adapt to, readjust, and control the natural environment.

5. Strengthen environmental education, raise all our people's consciousness of the environment. In a country full of "environmental blindness", it is hard to envisage fundamental improvements in the environment. China has already paid a heavy price for its population and environmental problems but this sort of lesson and price has not been fully converted into vivid teaching materials for education on the population and environment. The development of education on population and the environment lags far behind the levels required for China's birth control and environmental protection activities. In the future, we must place education on our national conditions, including population education and environmental education, throughout the entire process of our national education system, make it permeate education in all related disciplines, and make population control and environmental protection truly become a conscious activity of all our people and a concern of all our people.

6. Actively develop social guarantee activities in rural areas, help the peasants change their views on reproduction.

C. Actively readjust natural resource development and utilization strategies and policies

Development and utilization of natural resources is a primary active link between population and the environment. Making good readjustments in the process of natural resource development and utilization is a basic measure for improving the relationship between the population and the environment in China.

To strengthen resource protection and promote rational development and utilization of resources, China has promulgated over 10 basic laws concerning natural resources and the environment since the late 1970's. In the 1988 reform of government structure, the resource management functions of various State Council organs were strengthened and we gradually adopted several market and economic measures in administrative patterns to readjust resource utilization that played a positive role in improving resource management and establishing the required administrative supervision mechanisms. However, because many problems have accumulated during the long-term development process, we face many difficulties now that are manifested in a



concentrated way in the concurrent existence of supply shortages and excessive consumption of resources. Because this phenomenon was rooted in a numerical expansion-type industrial strategy of low wages and raw materials prices and high prices for industrial products that China implemented over a long period and was rooted in an economic system that followed an administrative pattern in allocating natural resources without compensation or at low prices, it will not be easy to eliminate in a short period of time. In consideration of long-term development, China should begin with the overall situation, readjust natural resource development and utilization strategies and policies, gradually eliminate impediments to rational resource utilization in economic development strategies and the economic system, restrict factors of resource renewal and accumulation, and establish socioeconomic mechanisms to guarantee regular renewal and reproduction of natural resources. We can consider these readjustments:

1. Make conserving resources and raising resource utilization rates a major objective and task in the state's overall resource development and utilization strategy and place it in a strategic status equal to the objective of increasing resource supply capacity to combine reductions in use with increases in sources.

2. Develop natural resource accounting and include it in the national economic accounting system. At present, we should solidly do good material accounting of resources on the basis of survey work for all categories of resources and gain an understanding of historical changes of growth and decline. At the same time, we should actively develop resource value estimation work and establish resource value accounting method system and value accounting tables. When the conditions are mature, we should establish a complete national natural resource accounting system and make it part of our national economic accounting system.

3. Gradually readjust the natural resource deployment system with its thick administrative coloring, reform the existing natural resource price system, and eliminate the root economic causes of excessive increases in demand for natural resources and low efficiency utilization.

4. Encourage economic investment in natural resource reproduction, gradually establish regular resource depreciation and renewal accumulation economic compensation mechanisms to ensure permanent resource utilization.

D. Using the will of man as the core of environmental policies to develop China

Environmental protection in a country with a population of 1.1 billion is basically the same as other conditions, but there are obviously considerable differences in the problems faced and routes chosen for environmental protection in countries with smaller populations. For China, a vast population is a given national condition that cannot be changed quickly by the urgent desires of

people. How, then, can environmental policies be adapted to this less than ideal but real population situation?

China already has environmental policies and we should continue adhering to them. At the same time, we can consider these readjustments and developments:

1. Strive to guarantee the environmental rights and interests of our present and future population. China's existing population is an historical fact and future population growth is an historical continuation. Both have essential environmental rights and interests. Our present population of 1.1 billion lives in different natural or man-made ecological environments. Although there are definite differences in people's living standards for various reasons, China's standpoint and efforts are clear and resolute in the area of guaranteeing that all its population can live in an environment suitable for existence and development. China's environmental policies must focus on environmental problems in those regions with relatively serious environmental pollution and ecological deterioration in the short term, but even more important is that in the long term they must strive to improve the environment in which all of China's people exist. This means guaranteeing the environmental rights and interests of all of the Chinese people and guaranteeing the environmental rights and interests of all independent and individual citizens. This means satisfying the demand of our existing population for an excellent environment and protecting the rights and interests of our future population to live in a suitable environment. Without a doubt, this policy ideology is a long-term one and comprehensive and is a development over existing environmental policies.

Damage to the environmental rights and interests in Chinese society at the present time is manifested primarily in two areas. One is by a small number of people who let all of society bear the cost of the harm they cause by seeking to increase their personal interests. Examples include pollution created by small, scattered heating arrangements, pollution from vehicle exhaust, soil erosion caused by destruction of vegetation, and so on. The second is polluters as groups of legal persons (enterprises, for example) who encroach upon the environmental rights and interests of residents of the surrounding area, such as disturbing people with noise, polluting fish ponds with waste water, and so on. China's environmental policies have been relatively effective in preventing the first type of noneconomic activity in society, but new measures must be adopted to guarantee that the environmental rights and interests of individual citizens are not damaged by the behavior of group legal persons.

2. Further mobilize the mass participation in environmental management. China is a people's republic, so environmental protection is in the personal interest of all its people as well as a personal concern of all its people. Presently, most of China's environmental management is implemented in the name of the government and there

is relatively little mobilization of the masses to participate directly. Actually, China's environmental protection depends on government recognition and promotion. When the environmental rights and interests of the popular masses are harmed, they still rely mainly on making appeals to the government and to society. Very few apply legal weapons and use their own strengths to protect their legitimate rights and interests. China's environmental policies also face a choice of development directions: should they continue simply reinforcing direct administration by the government or should they use their forces to help the popular masses in participating in large numbers and directly in environmental protection? Given China's huge population and wide-ranging environmental rights and interests, we must acknowledge that there are limits to direct management of everything by the government. In the future, we should concentrate more of our forces on enlightening citizens with environmental knowledge and helping citizens protect their personal environmental rights and interests.

3. Use our large population advantages to carry out environmental construction. China's labor surplus is universal and long-term. Converting population pressure into ecological benefits is well worth doing. For example: 1) Large-scale afforestation and development of grasslands. Successful experiences have already been accumulated in this regard. The key is systematization and long-term adherence. 2) Large-scale dredging of river channels and water conservancy construction. China has rich and successful experience in this area, mainly in the areas of planning and organization. 3) Large scale planting of trees in urban areas and beautification of the environment. Construction of shelter forest belts in the huge northeast, north, and northwest China region is one example of using our abundant manpower resources. These sorts of ecological projects should be undertaken in a planned manner. 4) Large-scale undertaking of comprehensive utilization to convert trash into treasure. 5) Sending laborers to foreign countries to assume contractual responsibility for environmental projects, and so on.

In summary, an excess population is a negative factor in China but since it is a fact, we can also use positive guidance to turn this disadvantage into an advantage, thereby effectively reducing population pressures and opening up an avenue of long-term sustained development for China with its insufficiently comfortable conditions.

#### State Science Commission To Expand Use of Fly Ash

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[Text] Beijing, June 9 (XINHUA)—The State Science and Technology Commission (SSTC) is currently recommending the application of more than 20 techniques in China, which it believes will consume 35 million tons of fly ash a year up to 1995.

To expand the use of fly ash—burnt coal particles discharged from coal-fired power plants—is part of the government's effort to improve the environment and seek a diversified use of coal resources.

The target reflects the government's growing concern over the consequences of its coal-dependent economy.

The nation depends on coal for 75 percent of its energy consumption and over 80 percent of its power-generating capacity.

At present, coal based power plants discharge around 70 million tons of coal particles a year, polluting air and farmland. Fewer than 20 million tons of these particles are recycled annually.

Recommended applications include techniques used in the making of a variety of fly ash bricks, high grade cement and road-building materials.

According to SSTC sources, the government is also demanding the installation of displacement systems in coal-fired plants to separate fly ash. The discharge of fly ash into rivers will be prohibited by 1995.

The commission promised that it will do its best to employ domestic and imported technology and equipment to make better use of fly ash.

There are initial plans to use the material in the construction of new expressways in four provinces in south and southeast China.

#### Analysis of Desertification in China Conducted

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[Article by Zhu Zhenda [2612 7201 6671] and Wang Tao [3769 3447] of the Chinese Academy of Sciences Lanzhou Deserts Institute: "Analyzing Land Desertification Trends in China Over the Past 10-Plus Years Using Research on Some Typical Regions"<sup>(1)</sup>; manuscript received March 1990]

[Text] Abstract: Land desertification is a major ecological and environmental problem in the world today and China has a serious desertification problem. From the late 1950's to the early 1970's, China's deserts expanded at an annual rate of 1,560 km<sup>2</sup>. This overall trend has continued to develop over the past 10-plus years and they are growing at an annual rate of 2,100 km<sup>2</sup>. China's desert land area now exceeds 197,000 km<sup>2</sup> and the problem is most severe in sandy prairie land reclamation areas and near energy resource base areas. Examples show that adopting the necessary measures on degraded land can prevent its expansion and restore its production potential as land suitable for agricultural and pastoral uses.

Key terms: land desertification, evolutionary trends, interlocking agricultural and pastoral regions.

## I.

Land desertification is one of the major ecological and environmental problems in today's world. China has a desertification problem over an area covering 334,000 km<sup>2</sup>, of which 176,000 km<sup>2</sup> has already become desert and 158,000 km<sup>2</sup> is land with a potential risk of desertification (data from the 1970's), and it is still growing. The article: "Land Desertification Development Trends and Forecasts in North China" published by the Lanzhou Deserts Institute in 1984 pointed out that research on comparative analysis and trend forecasting for changes in the spatial distribution of degraded land in aerial photographs from the late 1950's to the early 1970's shows that the desertification problem in two regions should receive attention. One type is the possible evolution of land where desertification is now spreading into land with intensely developing and severe desertification, and some potential desertification land continuing to evolve into degraded land, especially in semi-arid prairie regions and interlocking agricultural and pastoral regions such as eastern Inner Mongolia, northern Hebei, and so on. The second type is the gradual evolution of potential desertification land into spreading degraded land due to frequent human activity near several developing or already developed energy resource base areas (coal mines, etc.) on sandy grasslands. It was also pointed out during comparative analysis of typical examples of reversal of degraded land in certain control demonstration regions that the benefits of control were obvious after adoption of measures in regions with active "growth" and "reversal" of desertification such as semi-arid interlocking agricultural and pastoral regions. Land which has degraded and lost its productive capacity was restored to land capable of production and the objective of controlling land desertification was attained. In contrast, excessive utilization of land caused desertification to spread. The fact that there were increases and decreases in the spatial range of land desertification on aerial photographs (or satellite photographs) in certain typical regions from the mid or late 1970's to the mid or late 1980's shows that this scientific inference conforms to objective reality.

To provide a scientific basis for strategic measures for territorial renovation and protection of the ecological environment, the Chinese Academy of Sciences Lanzhou Deserts Institute did research to monitor desertification in a large region east of Helan Shan [Alxa UI] in north China. It should be pointed out that desertification as discussed in this article refers to arid and semi-arid (including some semi-moist and moist) regions which have temporally synchronized sandy land surfaces and dry seasons or windy seasons and in which intense man-made economic activity has damaged the ecological equilibrium and caused the appearance of wind-blown sand activity as a primary characteristic in regions that originally were not barren desert, resulting in a decline in production capabilities and the appearance of a similar process of reversion to a sandy desert environment. Thus, it does not include the reversion of land to desert in the broader sense. In our work methods, besides doing

survey research on surface realities, we also utilized satellite photographs and aerial photographs from the mid (or late) 1970's to the mid (or late) 1980's for analytical calculations. Because of the vast area involved and the substantial amount of computing work, we first obtained data on changes in the spatial scope of land desertification over the past 10-plus years from analysis of aerial photographs and ground surveys for certain typical regions in different natural zones. This showed the broad outlines of evolutionary trends in land desertification over the past 10-plus years and we used this as a basis for deriving comprehensive data by continuing to supplement it with information from satellite photographs taken at different times.

This article only concerns the broad outlines of development trends derived from the first stage of comparative analysis of desertification trends in typical regions.

## II.

Because most desertification in north China is occurring in a large area east of Helan Shan which accounts for about 69.3 percent of the degraded land area, the typical region we selected begins to the northeast in the Hulun Boir prairie and extends southwest to Hedongsha, which is mainly a prairie pastoral region, interlocking agricultural and pastoral region, and arid agricultural region with a northeast to southwest strike. As a natural zone, it is mainly a semi-arid prairie zone and desert prairie zone. For comparison with desert zones, we also selected Alxa, Qaidam, Tarim, and other typical desert regions west of Helan Shan. The data source was aerial photographs and satellite photographs from two different periods covering the period 1975-1976 to 1985-1986, and extending into 1987 in some areas, but aerial photographs were unavailable for some regions for 1985-1986, so we used the scope of degraded land on 1975-1976 aerial photographs as a basis for actual surveys of increases or decreases in its spatial scope to obtain data on the changes. The choice of the typical regions took into consideration the spread of desertification within prairie land reclamation areas or desertification due to excessive grazing and noted the process of growing and intensifying desertification caused by mining region development. We also selected examples of advancing dunes caused by the effects of natural wind energy. In the area of desertification reversal, we took into consideration regions following the adoption of measures and were also concerned with natural reversal following the development of natural enclosure. As for indices of the development and reversal of desertification, based on China's characteristics, we felt that reductions in land productivity caused by the occurrence and spread of drifting sand and the expansion of its area and declines in production potential could be used as development characteristics. The gradual restoration of vegetation, gradual reduction in the area of drifting sand, and gradual restoration of productivity following the adoption of measures served as reversal characteristics. Table 1 shows the data obtained from the results of graphic analytical measurements based on the survey.

**Table 1. Development Trends of Land Desertification Over the Past 10-Plus Years in Some Representative Regions of North China (units: km<sup>2</sup>)**

Region	Area of representative region	Land converted to desert in mid-1970's		Land converted to desert in mid-1980's		Annual increase		Time period
		Area	Percent	Area	Percent	Area	Yearly rate of increase	
Eastern part of Bashang prairie land reclamation area, Hebei (Weichang, Fengning)	3,417	762.3	22.3	1,336.6	39.1	47.9	6.28	1975-1987
Western part of Bashang prairie land reclamation area, Hebei (Kangbao, Shangyi, Guyuan, Zhangbei)	13,833	1,761.7	13.4	3,272	24.9	125.9	7.14	1975-1987
Qahar prairie land reclamation area and pastoral area, Inner Mongolia (Duolun, Zhenglan Banner, Xianghuang Banner, Zhengxiangbai Banner, Taibus Banner)	9,056	2,848.3	31.5	5,992.9	66.1	262.1	9.20	1975-1987
Upper reaches of Xiliao He and Horqin Desert, Inner Mongolia (Jirem League and Ju Ud League)	42,300	28,971	68.4	32,851	77.6	323.3	1.12	1976-1988
Hou Shan prairie land reclamation area in Ulanqab League, Inner Mongolia (Huade, Shangdu, Qahar Youyi Hou, Qahar Youyi Zhong, Siziwang, Darhan Muning'an, Wuchuan)	46,660	2,031.4	4.4	4,055.2	8.7	168.7	8.30	1975-1987
Ordos prairie in Ih Ju League, Inner Mongolia (Dongsheng, Ejn Horo, Jungar, Otog, Eqian and Uxin Banner)	49,112.4	43,407	88.3	45,973	93.6	256.6	0.59	1977-1986
Along Great Wall in northern Shaanxi (Shenmu, Hengshan, Jingbian, Dingbian)	18,046.4	7,808	43.3	8,166.9	45.3	35.9	0.46	1977-1986
Southwestern part of Ordos prairie in southeast Ningxia (Yanchi)	6,761.2	1,368.9	29	1,845.5	31.8	47.6	3.48	1977-1986
Wind-blown advancing dunes near Shugui Hu in Alxa Right Banner in central part of Alxa Desert, Inner Mongolia	1,573	1,171.6	74.5	1,308.4	83.2	13.6	1.16	1974-1984
Grassland desertification in northern part of Ulanqab prairie, Inner Mongolia (including drifting sand, shrub sand dunes, and coarsening)—Shangdu, Huade, Qahar Youyi Hou, Qahar Youyi Zhong, Siziwang, Wuchuan, Darhan Muning'an	46,660	8,445	18.1	14,166	30.4	476.8	5.65	1975-1987
Lower reaches of Ruo Shui in western part of Alxa Desert, Inner Mongolia	16,200	3,480	21.5	5,955	36.8	225	6.47	1975-1986
Kunlun Shan premontaine plain in southern part of Qaidam Basin, Qinghai	7,920	4,400	55.5	5,573	70.4	117	2.66	1976-1986

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We must point out regarding the data in Table 1 that: 1) Although the data do not cover all of northern China, the spatial scope represented by the typical regions that were selected now concern 60.6 percent of China's total degraded land area and include interlocking agricultural and pastoral regions and grassland pastoral regions where

desertification is most active in China; 2) Consideration was given to regions with a sustained spread of desertification due to the combined effects of natural factors (the effects of aridity and wind energy) and man-made factors (population growth and intensive land use) in the selection of typical regions. We also considered readjustments in



land-use structures over the past 10-plus years (to reduce the ratio between arid cultivated land threatened by desertification and expansion of land used for forests and prairie) and regions which have already attained preliminary ecological and economic benefits from the adoption of several control measures; 3) We also took into consideration differences between east and west China in natural conditions of degraded land, from eastern Inner Mongolia, which has 450 to 500 mm of precipitation a year, to southeast Ningxia, which has 250 to 300 mm of precipitation a year, and even to the desert zone west of Helan Shan, which has less than 200 mm of precipitation a year to reflect the characteristics of "elastic regions" which have an ecological "desertification process self-restoration capability" for auto-reversal of degraded land after the elimination of interference from man-made economic activity.

For precisely this reason, although the information given in Table 1 is data for desertification growth trends in some typical regions, one can also see the overall outlines of desertification growth trends over the past 10-plus years.

### III.

Analysis of Table 1 indicates that the overall evolutionary trends in land desertification over the past 10-plus years have the following characteristics:

1. Land desertification continues to develop. Although there has been some reduction in area in local regions since 1975, the overall trend is continued expansion. This is especially true of the gradual evolution of potential desertification land into developing desertification land which has led to an obvious increase in the area of degraded land. There was another increase of 17,448

km<sup>2</sup> in interlocking agriculture and pastoral regions, pastoral regions, and arid agricultural regions in semi-arid zones through 1986, an average yearly increase of 1,745 km<sup>2</sup>. There was also an increase of 3,556 km<sup>2</sup> in arid zones over the same period, an average yearly increase of 355.6 km<sup>2</sup>. This added another 21,000 km<sup>2</sup> to China's degraded land area, an average yearly increase of 2,100 km<sup>2</sup>. However, the potential desertification land area was reduced by 137,000 km<sup>2</sup>, which is another characteristic of the expansion of degraded land over the past 10 years.

2. The rate of growth shows that based on analysis of averages, the past 10 years was greater than the 1950's to 1970's. This was mainly due to the existence of a threat of the evolution of potential desertification land. There are qualitative differences from the 1950's to 1970's, however. The first period mainly involved the development of degrading land into severe desertification land with undulating dunes which completely eliminated the productive capabilities of the land. Development over the past decade, however, was characterized by the appearance of soil erosion and coarsening and sheet drifting sand on arid farmland and prairies. Although indications of desertification have already appeared on this land, some of it still retains its production potential and can be controlled by the adoption of the necessary measures.

3. There was a reduction in the spatial scope of degraded land in all regions which actively adopted measures for control over the past 10-plus years (Table 2), but the amount of the reversal was still very small compared to the area with developing and spreading desertification. Thus, estimations of desertification on China's territory over the past 10-plus years indicate that growth is still greater than reversal.

Table 2. Reversal of Land Desertification Over the Past 10-Plus Years in Some Typical Regions (units: km<sup>2</sup>)

Region	Area of representative region	Land converted to desert in the mid-1970's		Land converted to desert in the mid-1980's		Annual increase		Time period
		Area	Percent	Area	Percent	Area	Yearly rate of increase	
Southern part of Hulun Buir prairie, Inner Mongolia (Huihe)	51.2	17.05	33.3	2.9	5.6	-1.4	-8.3	1975-1985
Southeastern part of Mu Us Desert, northern Shaanxi (Yulin)	655.1	5,729.8	87.5	5,248.1	80.1	-48.1	-0.84	1977-1986
Central part of Horqin Desert, Jirem League, Inner Mongolia (Naiman)	2,709	1,270.9	46.9	1,152.3	42.5	-8.5	-0.67	1974-1988

4. Land desertification trends in north China over the past 10 years can be divided into several categories on the basis of numerical values: Category 1: Severe risk of a rapid spread of desertification. This is land where desertification directly threatens the people's livelihood and the environment and the development of agriculture and animal husbandry, but because this land still preserves some arid agriculture and pasture landscapes, the indications of desertification have seasonal landscape variations so they have not aroused universal concern of

people and few control measures have been adopted. The yearly rate of growth of desertification is very high, however, 5 to 10 percent, and it is still spreading rapidly. Examples include Fengning on the Bashang prairie in Hebei, Ulanqab prairie land reclamation area in Inner Mongolia, and so on. They are also very obvious in the lower reaches of interior rivers in desert zones such as the lower reaches of the Ruohai, the lower reaches of Tarim He, and so on. Category 2: Moderate spread of desertification. Most of these regions are land where

there originally were rather obvious indications of developing desertification and where there are obvious undulating dunes on the ground. Because of concern over the severity of the desertification problem over the past decade, measures were adopted which alleviated the degree of desertification development and there is still a tendency toward growth, but there has been a reduction in the yearly growth rate compared to the period prior to the mid-1970's, with yearly growth rates of 2 to 5 percent. Examples include Yanchi in the southwestern Mu Us Desert, southern Qaidam Basin in Qinghai, and so on. Category 3: Obvious reduction in extent of the spread of desertification but continued potential for development activity. This has a yearly growth rate of less than 2 percent and includes two types of situations. One is originally rather serious growth of desertification but a reduction in the degree of the threat due to the adoption of measures in recent years and reversal in some regions. The overall trend toward expansion persists, however, but there has been an obvious reduction in the yearly growth rate. Examples include the area outside the Great Wall in the southeastern part of the Mu Us Desert, the central part of the Horqin Desert, and so on. The second type of situation is one in which the original growth of desertification was not severe and most is pasture or arid agricultural land. There has been obvious development of desertification over the past several years and although the yearly growth rate is not extremely large, there is considerable potential risk and the desertification is in a state of beginning activity, such as the Hulun Buir and Xilin Gol prairie, and others.

The spatial distribution characteristics of desertification growth trends over the past 10-plus years show that the following points deserve attention:

1. Sandy grassland arid land reclamation areas which were formerly potential desertification land or are currently developing desertification are regions in which there has been marked expansion of desertification over the past 10-plus years. The six to 10 percent yearly growth rates of desertification land in Huade, Shangdu, and other parts of the Hou Shan region in Inner Mongolia and in Fengning, Weichang, Kangbao, and other parts of the Bashang prairie arid land reclamation area in northern Hebei indicate that these regions have a severe threat of developing desertification at the present time. Although an arid agricultural landscape still dominates these regions at present, there are obvious seasonal variations, with them taking the appearance of farmland during the summer and fall and being full of wind-blown sand during the spring and winter. Wind energy causes deflation of the soil on the potential loose sandy surface, the surface coarsens, and there is substantial loss of organic matter, usually reduced by 23 percent from before being eroded by the wind, and there is a 29 percent reduction in fine particle content compared to prior to deflation. After three to five years, the rapid formation and development of deflation and sheet drifting sand on the farmland impoverishes the land and reduces useable land resources. The cultivated land is

abandoned as a drifting sand deflation and coarsened land landscape. An example is the region south of Yudaokou at Weichang, where 58 percent of the arid agriculture cultivated land has been converted completely into desert. Degraded land accounts for as much as 73.1 percent of the area of Tailugou in Kangbao County, which means that about three-fourths of its land has already lost the ability to produce. The spread of desertification in the Hou Shan prairie land reclamation area in Inner Mongolia's Ulanqab League has similar characteristics. Moderately deflated cultivated land has expanded from 1,711 km<sup>2</sup> in the 1970's to 2,801 km<sup>2</sup> and intensely deflated land has increased from 320 km<sup>2</sup> in the 1970's to 1,144 km<sup>2</sup>. The main characteristics of growing desertification in this prairie land reclamation area over the past 10-plus years have been the appearance of surface deflation coarsening and blowing of shrub forest dunes. This situation is shown in Table 3. The main reason for the rapid development of land desertification in these regions is excessive prairie land reclamation and the absence of protective measures combined with successive years of drought. Average yearly precipitation over the past decade has been 30.1 mm below the perennial average precipitation of 340.2 mm, so as soon as the land loses its vegetation cover, wind energy quickly causes the development of deflation and the formation of drifting sand in the downwind direction which promotes the spread of desertification. Land desertification has developed above the dam [Bashang] and in all the regions below the dam [Baxia]. At Weichang, for example, degraded land below the dam now accounts for 36.4 percent of the county's total area of degraded land. The area of farmland at Xiaobazi in Fengning threatened by desertification over the past 25 years has grown to 48.1 percent of the total area of cultivated land.

**Table 3. Examples of Desertification Development Trends in Prairie Land Reclamation Areas Over the Past 10 Years**

Region	Percentage of cultivated land area accounted for by shrub forest sand dunes in deflated and coarsened cultivated land areas	
	Mid-1970's	Mid-1980's
Duolun (Dolonnur)	14.1	30.5
Huade	13.2	37.7
Kangbao	14.7	21.2
Shangyi	2.2	10.8
Fengning	11.4	15.9

2. Although several former regions of major desertification like the Horqin sandy region in eastern Inner Mongolia, Hedong sandy region in Ningxia, Ih Ju League in Inner Mongolia, and the sandy area along the Great Wall in northern Shaanxi have grown some over the past 10-plus years, their yearly growth rates have been smaller than prairie arid land reclamation areas. The reason is that land desertification in these regions has already developed to the severely or intensely developing stage

and two-thirds of the land has already been converted to desert. The others are basically farmland and lake basin beach land, which is land that has not been degraded, so the scope of their spatial expansion has been restricted. Some regions have been turned into land used for forests and prairies after control and the proportion of the total county area which has been degraded has been reduced. Examples include Yulin, Hengshan, Jingbian, Naiman, and other areas. As a result, while there has been growth in these regions, the pattern of development has mainly been only an intensified degree of desertification (an increase in intensity) and the numerical value of the expansion of the new area in contrast has not been as fast as the speed in prairie arid land reclamation areas. An example is Dingbian County, where there has been no increase in the degraded land area over the past 10-plus years, dropping from the original 46.6 percent to 38.5 percent, but the degree has intensified. Land with severe desertification accounted for 12.64 percent in the mid-1970's but increased to 15.89 percent by the mid-1980's. A similar situation exists in Otog Qian Banner. Still, it must be pointed out that the desertification problem has become more serious in several sandy loess hilly regions over the past 10 years and there has been extremely marked wind-blown sand activity on loess hills and tablelands. In the northern part of Huanxian County, for example, the area of degraded land has expanded by an average of 69 km<sup>2</sup> a year. Thus, concern for water and soil conservation in loess regions should be combined with attention to the problem of desertification in sandy loess regions.

3. For the past several years, construction of energy resource base areas in sandy prairie regions, especially construction of open-cut coal mines, has strengthened frequent man-made economic activity, firewood gathering has destroyed natural vegetation, and excavation of coal deposits has exposed sandy strata at the surface. The effects of blowing, erosion, and accumulation by wind energy have caused extremely rapid spread of land desertification. The yearly growth rate of desertification in Jungar coal field and nearby areas has reached 0.59 percent, which has increased the desertification area by 66.8 km<sup>2</sup>. The yearly growth rate of desertification at Shenfu Dongsheng coal field and adjacent areas is 0.79 percent, which has increased the desertification area by 457.9 km<sup>2</sup>. Coal field development in sandy loess hilly regions of northern Shanxi has also led to the evolution from a formerly scattered distribution of degraded land to the coverage of 3 percent of the sandy loess hilly region land

area in northern Shanxi, so it is apparent that desertification is spreading. The situation is similar in Huolinhe coal field and adjacent areas in eastern Inner Mongolia's Jirem League. Thus, attention should be given to the spread of desertification caused by the development of industrial and mining construction and good preventive work must be done.

4. The adoption of land-use structures and a series of enclosure and development measures to enclose and protect forests and consolidate sandy hills and so on in desertification auto-reversal regions with ecologically "elastic" characteristics can lead to reversal within 5 to 7 years. This has been illustrated by the reductions in the area of degraded land over the past 10-plus years in the southeastern part of the Mu Us Desert near Yulin and the central part of Horqin Desert near Naiman. Although the reversal has been slow and the numerical value of the reversal small, the reversal conditions show that it is possible to control desertification in semi-arid interlocking agricultural and pastoral regions. It deserves special mention that various environmental improvements on degraded land in the Hulun Buir prairie with somewhat better natural conditions that has been restored to a camphor and pine forest can illustrate full utilization of the characteristic of ecological "elasticity". Adopting measures adapted to local conditions has practical significance for controlling desertification.

The development of prairie desertification over the past 10-plus years also deserves attention, especially in the northern part of Inner Mongolia's Ulanqab prairie where it increased from 18.1 percent of the region during the mid-1970's to 30.4 percent in the mid-1980's. It is manifested as coarsening of the ground surface and by the appearance of scattered and sheet drifting sands and semi-drifting shrub forest dunes. There have also been changes in the quality of pasture lands. There has been a shrinkage of zhenmao [6859 5403], which dominated the primitive vegetation, and an increase in lenghao [0397 5548] and other weeds. In the northern part of Darhan Muning'an United Banner, for example, there has been a 70 to 80 percent reduction in output of grasses and pasture production has declined.

In Qahar pastoral region, desertification is manifested primarily as coarsening of pasture land and the ground surface assuming a sandy conglomerate appearance. The vegetation is extremely sparse and the development trend over the past 10 years has been apparent. Table 4 illustrates this problem.

Table 4. An Example of Land Desertification Development Trends in a Pastoral Region  
Over the Past 10 Years—Qahar Prairie

Region	Changes in the percentage of counties' land area comprised of coarsened pasture land	
	Mid-1970's	Mid-1980's
Xianghuang Banner	8.5 percent	17.3 percent
Zhengxiangbai Banner	13.8 percent	28.1 percent
Zhenglan Banner	3.5 percent	15 percent
Taibus Banner	4.0 percent	15.6 percent

Moreover, desertification is beginning to spread on the Hulun Buir prairie, especially along the communication lines between towns on the prairie. The degraded land area increased by 10.5 percent during the mid-1970's and it is growing at a yearly rate of 2.2 percent, which deserves attention.

6. Desertification development trends show that intensive man-made land utilization is the main factor and that although there has been an increase in land desertification due to advancing sand dunes caused by the effect of wind energy along the margins of sandy wilderness areas, it is still smaller than man-made factors. Dune progression and a 1.16 percent rate of yearly increase in degraded land near Shugui Hu in Alxa Left Banner on the edge of the Badin Jaran Desert can illustrate this problem.

7. In arid regions, expansion of the degraded land area due to the effects of wind energy on sand dunes in sandy wilderness areas is not extremely rapid, but the fact that degraded

land has been formed by the activation and evolution of sand dunes due to man-made activity around oases cannot be ignored. This can be illustrated by information on land desertification development trends at the southern edge of Qaidam Basin. In another area, the use of large amounts of water for agricultural purposes in the middle and upper reaches of interior rivers in arid regions that has reduced the amount of river water downstream and created a situation of rapidly growing conversion of land into desert is another important factor in the growth of desertification in arid zones. Land regression in the lower reaches of the Ruo Shui in western Inner Mongolia is an obvious example. Degraded land has been developing at a yearly growth rate of 1.8 percent around the green corridor in the lower reaches of Xinjiang's Tarim He over the past 10 years. It has resulted in increasing shrinkage of the area of non-degraded land (diversiform-leaved poplar forests and scrub forests) in the green corridor (Table 5). If measures are not adopted, the entire green corridor will become desert within 13 years.

**Table 5. Changes in the Area of Diversiform-Leaved Poplar Forest and Shrub Forest in the Green Corridor in the Lower Reaches of Tarim He (units: km<sup>2</sup>)**

Location	1973	1983	Reduction from 1973 to 1983	Reduction in percent
Tikanlik south to Kargi	317.5	224.7	92.8	29.23
Kargi to Argan	224.4	135.9	88.5	39.44
Argan to Igan Bujmal	92.6	34.2	58.4	63.07

Analysis of the above points shows that in work to prevent land desertification, attention must be given to protecting productive land in imminent danger of desertification. Neglecting this point may lead to the intensive utilization of land that may still be capable of producing but which already faces the threat of desertification. This would aggravate the extent of its development and the resulting economic losses arising from its growth would be much greater than the cost of controlling it.

A simplified chart of desertification trends for three types of land use patterns in various regions of north China over the past 10 years is provided in Figure 1.

#### IV.

When analyzing the problem of desertification in arid and semi-arid regions of north China, it also must be pointed out that the problem of land with windblown sand in semimoiest and moist zones over the past 10 years has become a rather acute ecological and environmental problem. It has increased by 3 million mu over the past 10-plus years and although the area is not large and still has not developed into a "surface" shape like it has in semi-arid zones, it has appeared as "points" along the coast, on the Huang-Huai-Hai plain, in arid river valleys of mountainous areas of southwest China, and on alluvial plains and lakeshore plains in the lower reaches of certain rivers in central China. The windblown sand area in the lower reaches of the Gan Jiang near Nanchang in Jiangxi and along the banks of Poyang Hu has reached 32,000 hectares

and is growing at a yearly rate of 0.75 percent. Land desertification is now developing in several mountainous arid river valley regions of Sichuan and Yunnan (such as the Jinsha Jiang, Min Jiang, Dadu He, Yalong Jiang, Yuan Jiang, and so on). Sub-high mountain forests formerly along the rivers have evolved into tropical shrub forests with few trees and then into savanna landscapes. In the 1950's, savanna and shrub forest landscapes could only be seen at elevations of 500 m above the Jinsha Jiang river valley but they pushed upward to 300 m in the 1980's. On the alluvial fans protruding from the bank in the valley bottom of the Jinsha Jiang from Dukou City south to Longchuanjiangkou [mouth of Longchuan Jiang], chains of crescent-shaped sand dunes have developed from a scattered distribution over 10 years ago to the present belt-shaped intermittent distribution and the yearly growth rate has been as much as 1.2 percent. In addition, activation of consolidated sand dunes along the coast and the formation and spread of sheet drifting sand is one way in which windblown sand has spread on coastal land during the past 10-plus years. The southwestern part of Hainan Island is an especially obvious example. The island's total land area of windblown sand in the 1980's was 14 percent greater than in the 1950's. Activation of consolidated sand dunes and the development of sheet drifting sand have appeared on land with windblown sand at the flood fans of the Huang He and the old Huang He channel and deflation of soil on farmland has also spread, becoming one of the factors for declining agri



区域 a	牧地 b	旱农地 c	灌溉地 d	其它(居民点 能源基地等) e
呼伦贝尔 f				
科尔沁 g				
锡林郭勒 h				
乌兰布(后山) i				
察哈尔及坝上 j				
鄂尔多斯 k				
陕北长城沿线 l				
宁夏东南 m				
阿拉善西部 弱水下游 n				
柴达木昆仑山 北坡山前平原 o				

沙漠化正在发展    沙漠化加剧    沙漠化程度减轻    无显著变化  
 p    q    r    s

Figure 1. Simplified Diagram of Land Desertification Development Trends in North China Over Past 10 Years

## Key:

- a. Region
- b. Pasture
- c. Dry farmland
- d. Irrigated land
- e. Other (residential sites, energy resource base areas, etc.)
- f. Hulun Buir
- g. Horqin
- h. Xilin Gol
- h. Xilin Gol League
- i. Ulanqab (Houshan)
- j. Qahar and Bashang
- k. Ordos
- l. Along Great Wall in northern Shaanxi
- m. Southeastern Ningxia
- n. Lower reaches of Ruohai in western Alxa
- o. Premontane plain on north slope of Kunlun Shan in Qaidam
- p. Desertification now developing
- q. Intense desertification
- r. Reduction in degree of desertification
- s. No apparent change

cultural output in the area. In Shandong, for example, the windblown sand land area has reached 18,426,400 mu (12,284.3 km<sup>2</sup>), of which 11,089,300 mu (7,392.9 km<sup>2</sup>) or 60.18 percent is sandy cultivated land that has been deflated to varying degrees. This is not the only case. In the area along the Huang He diversion trunk canal, new windblown sand land has been formed by the effects of wind energy on canal silt during relatively arid winter and spring monsoons, threatening adjacent farmland, highways, and residential points. In west Shandong alone, for example, it is expanding by 4.4 to more than 5.8 km<sup>2</sup> per year. Thus, concern about desertification in north China should be combined with concern about the development of land with windblown sand over the past several years in moist and semimoist regions of south and east China. Of course, attracting the concern of government departments and adopting measures in these regions could prevent its spread and transform it into land used for agriculture and forestry or fruit orchards. Sandy land in the old Huang He channel at Yucheng in Shandong increased from 1.56 percent of the total area in the late 1960's to 12.61 percent in the 1980's, but it was quickly reduced to only 1.5 percent after control measures in the mid-1980's and the sandy land has been converted into farmland and orchards. The organic matter in the surface layer (0 to 70 cm) of the sandy soil had increased by 55 to 72 percent two years after upgrading compared to the drifting sand land prior to control, providing ecological and economic benefits. Thus, attention should be given to the question of land with windblown sand in moist and semimoist regions, and adopting active measures is an important to restore the productivity of land which is regressing at present.

## V.

Based on the natural and economic conditions of desert regions in north China, desertification development trends, problems that exist in development and utilization, and typical examples of control, control of degraded land should be oriented toward the goal of combining ecological benefits, economic benefits, and social benefits and adhere to appropriate utilization, mutual supplementation by multiple items, and other ecological principles, and combine prevention with development and utilization. In other words, it can focus on comprehensive control of degraded land, base itself on improvement of the ecological environment and production conditions, and base itself on integration of unified planning and comprehensive control with a production administration responsibility system that assigns contractual responsibility to ecological households to motivate initiative in all areas for close integration of hard inputs and soft inputs. For this reason, we

should focus on a model of readjusting existing land use structures and rational resource development and utilization for land with potential desertification and developing desertification. In regions with severe and intensely developing desertification, we should focus on a model of increasing inputs of the corresponding man-made additional energy and materials to rebuild the ecosystem. For control countermeasures, we should make comprehensive considerations from the perspective of improving the ecosystem of entire arid and semiarid regions and make comprehensive plans, and adhere to the principle of focusing on forestry and animal husbandry and economic diversification as the direction of economic development. At the same time, we should also effectively control population growth and keep the rate of increase below 1.3 percent to reduce population pressures on degraded land and reform the energy resource structure of sandy regions to reduce destruction of vegetation. In concrete deployments for control, there should be a three-level configuration of a focus on conducting control experiments employing scientific research organs as experiment areas, a focus on integration of scientific research organs with production departments to provide demonstration areas for a specific area, and a focus on extension areas which integrate scientific research organs, production department, and the local masses to attain the objective of receiving ecological, economic, and social benefits from scientific research experiments on desertification. Three systems must be established to attain these three objectives: 1) A powerful, highly efficient, and relatively stable leadership and decision making system at all levels; 2) A technical consulting and forecasting system composed of S&T departments at all levels; 3) An implementation system which integrates basic-level leadership with the masses.

In the area of actual control measures, to deal with the characteristics of scattered residential sites, cultivated land, and pastures in desert regions with interlocking agriculture and animal husbandry, ecological households can serve as the basis for adopting natural enclosure and development to readjust the land utilization structure dominated by dryland crop agriculture and expand the proportion of forests and grassland, concentrate on managing land with better water and soil conditions and on measures to integrate afforestation zones, forest nets, cultivating plants on hilly surfaces to consolidate sand, planting forests between hills, and enclosure and development to attain the goals of controlling the development of desertification and playing a role in economic development and achieving unity of ecological with economic and social benefits. Table 6 shows two notable examples.

**Table 6. Changes Before and After Control at Yaoledianzi in Naiman Banner, Horqin Sandy Region and Shabianzi in Yanchi, Southwest Mu Us Sandy Region**

Item	Region			
	Yaoledianzi, Naiman Banner		Shabianzi, Yanchi	
	Year			
	1984	1988	1985	1988
Area of drifting sand (mu)	15,000	5,000	22,093.50	15,082.50
Forest and grass coverage (percent)	10	30	7	30
Grass output of sandy land (kg/mu)			16	88
Total grain output (kg)	150,000	250,000	146,000	214,000
Per capita income (yuan/year)	190	430	399.80	893.80

Besides making rational determinations of livestock carrying capacities, rational rotation of grazing, and establishing artificial grassland and feed base areas in prairie pastoral areas, there should also be integration with rational deployment of water wells, determination of grazing point densities, construction and consolidation of roadways, and so on. Carry out comprehensive planning in arid zones using river basins as ecological units, rationally allocate water use plans, and rationally adopt integrated measures such as using oases as a basis for establishing shelter forest networks within oases and sand barrier forest belts and consolidation of sand dunes (integrate mechanical sand barriers with cultivation plans for sand consolidation within the barriers) around oases in conjunction with trees and shrubs around the edges of oases to form integral protection systems. Pingchuan oasis at Linze in the Hexi Corridor is an example. Adoption of this control model prevented the drifting sand from making inroads into the oasis and restored productivity to land which previously had lost its productive capacity. A new oasis was established and the area of drifting sand was reduced from 54.6 percent prior to control to 9.4 percent. Moreover, the area of the oasis was expanded from 8.9 percent prior to control to 37.8 percent. Another example is integration of consolidation and obstruction in the Shapotou region at Zhongwei on the southern edge of the Tenger Desert. After adopting a system using consolidation as the main protection, the vegetation coverage increased from the former 5 percent to 30 to 40 percent. This ensured that the railroad was kept open through the desert and measures like warping, land levelling and preparation, soil improvement, planting shelter forests, and so on transformed sand dunes on low terraces of the Huang He into orchards and farmland and turned sandy land into oases.

The adoption of sand levelling and soil preparation, planting shelter forest networks, water conservancy, and other measures in windblown sand land form in the ancient overflow river bed of the ancient Huang He in semimoiest regions converted 79 percent of the wind-blown sandy land into cultivated land in just over three years. The amount of cultivated land per household was

increased by 5.4 mu and per capita grain harvests were 305.6 jin. Per capita incomes rose from 370 in 1985 prior to control to 650 yuan in 1989 after control.

These examples show that the adoption of these principles and concrete measures on degraded land can prevent its spread and restore its production potential and turn it into farmland and pasture.

## VI.

The preceding analysis leads to this conclusion: there is an overall tendency toward continued development of land desertification in north China over the past 10-plus years and it is continuing to spread at a rate of 2,100 km<sup>2</sup> per year. China's degraded land area has now grown to 197,000 km<sup>2</sup>. The spread of desertification has been especially rapid in sandy prairie land reclamation areas and near energy resource base areas and these in particular should receive attention. Examples include coal field development regions like the Bashang region in northern Hebei, the Houshan region in Inner Mongolia, and Shaan-Sui-Meng triangle region, and so on. This type of development trend can be checked, however, by the adoption of a series of necessary control measures, and the degraded land can have its productive potential restored.

For this reason, we propose: 1) The land desertification process in north China and its comprehensive control (especially in interlocking agriculture and animal husbandry regions of eastern and central Inner Mongolia, northern Hebei, northwest Shanxi, the Beijing suburbs, northern Shaanxi, and southern Ningxia) should be included in state attacks on major scientific problems during the Eighth Five-Year Plan and research undertaken, and we should establish several different types of land desertification (or windblown sand) control demonstration areas under different natural conditions to serve as a foundation for future extension; 2) Because desertification is an ecological and environmental problem that concerns a broad range of issues, and because China has no single department at present for comprehensive leadership and arrangements, we propose that the state

establish a land desertification control commission or leadership group for unified leadership, deployments, planning, and research concerning control of desertification similar to the State Water and Soil Preservation Commission.

#### Footnotes

[1] Chen Guangting [7115 1639 1656], Zhang Minli [1728 3046 0500], Yang Taiyun [2799 3141 6663], Hu Mengchun [5170 1322 2504], Chen Weinan [7115 3262 0589], Han Guang [7281 1639], and others also participated in this research project. The relevant comrades wrote about current desertification conditions and trends for each region to serve as part of an overall report.

#### References

[1] Zhu Zhenda [2612 7201 6671], Liu Shu [0491 1859], et al., *Zhongguo De Shamohua Ji Qi Zhili* [Desertification in China and Its Control], Science Press, 1989.

[2] Zhu Zhenda, "Advances in Research on Desertification in China", *Zhongguo Shamo* [Chinese Deserts], Vol 9, No 1, 1989.

#### New Magazine on Population, Environment

SK1805035191 Jinan Shandong People's Radio  
Network in Mandarin 2200 GMT 17 May 91

[Text] ZHONGGUO RENKOU ZIYUAN YU HUANJING ZAZHI [Magazine of China's Population, Natural Resources, and Environment], jointly directed by the State Science and Technology Committee and Shandong Teachers' University, will soon be off the press.

The magazine is a seasonal publication. It is China's first academic periodical guided by policies on population, natural resources, and environment, focusing on the research of the relationship of population, natural resources, and environment.

#### Guizhou Province Awards Three Mayors for Environmental Work

OW0506170991 Beijing XINHUA in English  
1444 GMT 5 Jun 91

[Text] Guiyang, June 5 (XINHUA)—To recognize "World Environment Day," three mayors in southwest China's Guizhou Province today received prizes from the provincial government for their prominent contributions to improving the environment of their cities.

This is the first time the province has rewarded mayors on the basis of the environmental condition of their cities.

The prize winners are mayors of the cities of Guiyang, Liu Panshui and Zunyi. They were given honorary certificates and bonuses ranging from 4,100 yuan to 4,400 yuan.

Local residents said that the mayors deserve the honor.

Meanwhile, the provincial government also published the survey results of the environmental conditions of these cities, which show that along with social and economic development, the deterioration of the environment and major sources of pollution in these cities have been effectively controlled.

These cities have all set up environment protection systems and outlined specific goals to maintain the quality of their surroundings.

Guizhou Province is situated on the Yun-Gui highland. Its rich natural resources have attracted many large enterprises, which generate a great deal of pollutants. In addition, urban residents use coal as their major fuel, which emits large quantities of sulfide and fluoride into the air. Guiyang, the capital city of the province, is one of the cities in China most adversely affected by acid rain.

In its attempt to improve the situation, the provincial government designated in 1989 environmental protection as a significant element of city mayors' performances.

## CAMBODIA

**Kompong Speu Takes Steps Against Forest Depletion***BK1306060291 Phnom Penh SPK in English  
0418 GMT 13 Jun 91*

[Text] Phnom Penh SPK June 13—The authorities of Kompong Speu Province, 50 km west of Phnom Penh, have decided to reduce 90 saw-mills at present to 48 as a measure to prevent over-exploitation of timber in the province.

The measure is taken in accordance with a recent directive issued by the Ministry of Agriculture to limit the number of saw-mills and forestial products purchasing agencies in the country to help conserve the forest.

According to an official of the province's forest service the superfluous saw-mills set up in recent years process from 4,500 to 9,000 cubic metres of timber a year, which greatly depletes the forests in the province.

Efforts have also been made in reforestation. So far, the two afforestation sites called Prey Phdau and Phnum Kray have grown 10 ha [hectares] of cashew and 84 ha of acacia and eucalyptus. They also nursed saplings for growing on 150 ha this year.

## JAPAN

**Government To Draft Regulations on Outdoor Bioengineering***OW1006020791 Tokyo KYODO in English 0138 GMT  
10 Jun 91*

[Text] Tokyo, June 10 KYODO—A government panel has drawn up a draft report calling for regulations on conducting bioengineering experiments in the open air, officials said Monday.

The draft report, compiled by an expert panel of the Central Council for Environmental Pollution Control, calls for establishing a system to protect populations of species against outdoor gene manipulation experiments.

The panel proposed a system that would include an environmental impact statement by those wishing to conduct such experiments, a government examination, and the publication of utility plans and examination results.

The report said there is a possibility that creatures produced by gene manipulation will multiply and harm the natural order of existing populations of species.

Some 260 cases of bioengineering in the open air have been reported in the United States and Europe to develop farm products which would be more resistant to insects and microbes, the report said.

In Japan, one institute has been experimenting outdoors to develop a disease-resistant tomato, it said.

The panel will submit its report to a subcommittee of the council as early as this month, the officials said.

The Environment Agency plans to draw up a bill based on the report and submit it to the next ordinary Diet session, they said.

**Plan To Survey Tsushima Current, Monitor Pollution***OW1406043091 Tokyo KYODO in English 0218 GMT  
14 Jun 91*

[Text] Tokyo, June 14 KYODO—Japan plans to begin surveying the Tsushima current between Japan and South Korea on a regular basis soon, government officials said Friday.

The survey for fiscal 1991 was approved Friday at meeting of cabinet ministers discussing global environmental affairs.

Japanese environmental experts are going to take sea water from the Tsushima current from a ferry boat between the two countries, the officials said.

They will measure the amount of phosphorus and plankton in the sea water in order to gauge the pollution trend, they said.

They said the project is the first in the world to observe marine pollution at regular intervals.

Japan will work in cooperation with the South Korean Marine Institute, the officials said.

The government in a separate project will also build a fully automatic monitoring station to observe the greenhouse effect on Haterumamori Island, one of the Yaeyama Islands in Okinawa Prefecture on the southernmost tip of Japan.

The officials said another station will be built in Hokkaido, the northernmost Japanese main island next year.

This year's action plan, approved in Friday's cabinet session, appropriates 467 billion yen, an increase of five percent over last year, the officials said. Some 65 percent of the amount is allotted to projects related to nuclear power plants, they added.

## LAOS

**Thai Mass Media Reports on 'Yellow Rain' Denied***BK0806023891 Vientiane Vitthayou Hengsat Radio  
Network in Lao 0000 GMT 8 Jun 91*

[Text] On 6 June, Thai newspapers, radio, and television carried news reports saying that the Lao side has sprayed



toxic chemicals or so called yellow rain along the Lao-Thai border area adjacent to Thailand's Mae Charim District, Nan Province.

Regarding this, the Lao and Thai joint military committees, in the meeting on 6 June, checked the news reports on this matter and found out that they are completely groundless. It was just a slanderous propaganda cooked up against Laos by the third party or a group of ill-intentioned elements in Thailand with the hope of disrupting and sabotaging the good relations between Laos and Thailand, which have been systematically improved, promoted, and developed with each passing day.

The Thai officials should check and take appropriate measures to prevent the reoccurrence of such groundless news reports.

## SINGAPORE

### Steps Taken To Curb Use of Ozone-Depleting Chemicals

BK1706113191 Singapore *THE STRAITS TIMES*  
in English 17 Jun 91 p 22

[Text] Singapore has announced further measures to curb the use of ozone depleting chemicals.

The use of chlorofluorocarbons (CFCs) and halons in more industries will be gradually phased out between next year and 1998.

Since Singapore became a signatory of the Montreal Protocol in January 1989, the total consumption here of CFCs and halons, which are said to affect the ozone layer, has declined.

The Montreal Protocol wants countries to restrict their use of halons and to keep their use of CFCs at the 1986 level until 1993, after which consumption levels should be cut by 20 percent.

These chemicals are responsible for the hole in the ozone layer—the protective shield of gases which absorbs harmful solar ultraviolet rays.

If unchecked, the warming of the Earth could lead to dangerous rises in sea level, more severe cyclones and hurricanes and shifts in rainfall which could destroy present-day agriculture.

On Feb 5 this year, Singapore had already banned the import and manufacture of nonpharmaceutical aerosol products and polystyrene sheets using controlled CFCs.

Mr. Khoo Chin Hean, director of Environmental Policy and Management Division, said that in Singapore, the use of both chemicals had dropped significantly from 4,000 tonnes of CFCs and 2,400 tonnes of halons in 1986 to 3,500 tonnes and 1,800 tonnes respectively last year.

The new measures Singapore will introduce are:

—FROM JAN 1 1992: The installation of total flooding fire protection systems using halons H1301—such as in computer and electrical rooms—will be banned. But H1301 will continue to be available for existing systems.

—FROM JAN 1 1992: The import and sale of H24502, which is not used in Singapore, will be banned.

—FROM JAN 1 1993: Ban on the import and sale of new commercial and industrial air-conditioners and refrigerators using controlled CFC 11 and CFC 12.

—FROM JAN 1 1995: Ban on the import and sale of H1211 used in portable fire extinguishers, and also the sale of new fire extinguishers using halons. The grace period until then will allow new fire extinguishers that can operate with a substitute chemical to be developed and made available on a commercial scale.

—FROM JAN 1997: Ban on import and sale of H1301.

—FROM JAN 1 1998: Ban on import and sale of CFC 11 and CFC 12 to service air-conditioning and refrigeration equipment. The five-year grace period allows industries to plan and make the necessary changes to mechanical equipment.

The Ministry said that Japan and the West are trying to develop substitutes for use in vehicle air-conditioners and refrigerators. But if substitutes are not available before 1998, CFCs will still be imported for them.

## TAIWAN

### Economics Ministry Plans Environment Protection Company

OW1106081791 Taipei Voice of Free China in English  
0200 GMT 10 Jun 91

[Text] Economics Minister Hsiao Wan-chang said his ministry plans to establish an NT\$1 billion [New Taiwan dollars] engineering company in order to build an independent environmental protection engineering industry. Hsiao said government investment in environmental protection construction under the 1991-1996 six-year national development plan will be huge, and if the ROC [Republic of China] does not have its own environmental protection engineering industry, the market will be controlled by foreign companies.

Led by the China Steel Corporation, six state-run enterprises will jointly invest NT\$1 billion for the project, Hsiao said. The domestic market for environmental projects has been estimated in the neighborhood of NT\$300 billion annually.

## VIETNAM

**Environmental Conditions in Hanoi Outlined**

*BK0906074091 Hanoi VNA in English 0638 GMT  
9 Jun 91*

["Sunday Feature: Environment Protection in Hanoi"—  
VNA headline]

[Text] Hanoi VNA June 9—Urgent problems and a long-term plan for environment protection of the Hanoi capital were discussed at a seminar jointly organized here June 4 by the Hanoi Association for Protection of Natural Resources and Environment, the Union of Scientific and Technological Association and the Hanoi Environment Committee with UNDP's [United Nations Development Program] financial assistance.

Reports at the seminar noted that the population growth in Hanoi over the past three decades has rendered environment protection very imperative (the population of the inner city of Hanoi has swollen to 940,000 compared to 150,000 in 1954).

Generally speaking, not enough attention has been paid to sanitation and drainage during the planning and construction of new residential quarters.

Many new roads have caused local submersions due to the lack of evacuation sewers. Six hundred ponds and lakes have been filled, adding to the submersion. Annual budget for the dredging of mud from the four rivers in the capital was barely sufficient to do half of the job.

Besides, the unplanned building of new houses by the people has aggravated the drainage and sanitation problems. Twenty four hospitals and 245 factories and enterprises have no processing systems for waste and waste water (except the Olaf Palme Institute for Children Healthcare).

Due to the shortage of funds and means, each day the sanitation service can collect only 42.9 percent of the garbage and 21 percent of nightsoil. At present, the United Nations is deploying project VIE/86/023 to build a factory for processing 30,000 cubic metres of garbage per year.

In the outlying districts, the cutting of trees for fuelwood has shown no sign of relenting.

Eighty percent of the natural forests around Hanoi has become denuded to one extent or another. This has led to severe erosion and the filling up of river and lake beds. Tens of thousand of hectares of hilly land remain barren.

The official ban on the hunting of birds and beasts for food is not strictly observed.

The participants in the seminar proposed a number of concrete measures aimed at building a programme of coordinated actions by various branches for environment conservation.

The seminar proposed to launch a citywide movement to increase the people's awareness of environmental problems through the mass media and to include the movement in the curriculum of the general schools.

At the seminar, Mrs. Marlene Spezsti, representative of UNDP, pledged her organization's biggest effort to help Hanoi in environment protection.

## REGIONAL AFFAIRS

### **Bulgaria, Romania Meet on Ruse-Giurgiu Environmental Issues**

*AU1406200291 Sofia DUMA in Bulgarian  
11 Jun 91 p 2*

[Galina Antonova report: "Prefect of Giurgiu Region Personally Concerned About Purity of Ruse's Air"]

[Text] The specific demands, which Bulgaria and Romania will put forward to the European Community for funding from the PHARE [Poland-Hungary: Assistance To Restructure the Economies] program on resolving the ecological problems of the Ruse-Giurgiu region, brought together Bulgarian and Romanian experts from the Joint Coordinating Committee of the Ruse-Giurgiu Region.

In connection with the more frequent tip-offs of new pollution of Ruse's air from across the border, the Romanian experts declared that only installations producing epichlorohydrin vulcacides [vulkatsidi] and one installation manufacturing dyes were functioning. The others had been shut down due either to technical reasons or a lack of raw materials.

The Romanian representatives did not commit themselves to any explanations as to why Ruse's air, during the last two months, had been polluted periodically with organic substances every Friday, Saturday and Sunday.

Adrian Rantes, prefect for the Giurgiu Region, took part in the meeting. In the presence of a DUMA representative, he particularly wanted to make known his personal concern for the condition of Ruse's air and peace of mind of the people of Ruse.

The Romanian experts promised to reciprocate their Bulgarian colleagues' gesture and will also submit to them their package of demands for financial help for resources and apparatus from the 1991-1992 PHARE program.

Through the Romanians' fault, work has recently been suspended on implementing the recommendations of the United Nations Environmental Protection program to establish a joint coordinating committee responsible for controlling activities in the Ruse-Giurgiu region and working out its statute of rights and obligations. After an exchange of information between Bulgaria's and Romania's Foreign Ministries, this question is expected to be settled at government level in the near future.

### **Japan To Provide Antipollution Technology to Eastern Europe**

*OW1006210991 Tokyo KYODO in English  
1251 GMT 10 Jun 91*

[Text] Tokyo, June 10 KYODO—Japan will pledge to transfer to Eastern Europe technology used to stem industrial pollution at an international conference

starting June 21 in the Czechoslovak city of Dobris, Environmental Agency officials said Monday.

Environmental Agency Director General Kazuo Aichi will announce the pledge at the three-day conference of West and East European ministers in charge of environmental policy, the officials said.

The Japanese state minister for the environment will notify the conferees of Japan's intention to invite and train engineers from East European nations in its technology to help counter industrial pollution, they said.

The conference comes at a time when East European countries are trying hard to save their pollution-ravaged environments in the wake of the successive downfalls of the communist regimes responsible for widespread environmental contamination.

The international conference is to be hosted by a Czechoslovak government committee in charge of environmental protection policies.

Japan is among three non-European participants in the conference, along with Canada and the United States. The Soviet Union, which is itself suffering serious environmental problems, will also send delegates to the conference.

The conferees will debate ways to clear the East European environment of serious atmospheric pollution, how to regulate the discharge of toxic chemical substances, such as polychlorinated biphenyl (PCB), and measures to prevent water pollution at such rivers flowing across national borders as the Danube, the officials said.

The conferees will also debate how the participating countries should prepare for the United Nations-sponsored conference on global environmental issues, slated for June 1992, they said.

In addition to addressing the plenary session, Aichi will hold bilateral talks with the representatives from the United States, Germany and East European nations to find out what they expect Japan to contribute to multilateral efforts to tackle the global problems of industrial pollution, the officials said.

He will fly back to Japan on June 26 after visiting Poland to learn about the nation's industrial pollution problems, they said.

## BULGARIA

### **New Environmental Protection Measures Reported**

*AU1406162891 Sofia BTA in English  
1340 GMT 14 Jun 91*

[Text] Sofia, June 14 (BTA)—Bulgaria's environment problems are neither easier nor worse than those of Poland, Czechoslovakia, and Hungary, a high-ranking official of the U.S. Environmental Protection Agency (EPA) told a news conference at the Ministry of the

**Environment.** The condition of the River Danube is a common problem for Central and Eastern Europe. The pathogenic effect of blood lead on children is a grave problem both for Bulgaria and Czechoslovakia.

The World Bank, the EPA and the U.S. Agency for International Development sent a mission to this country to help work out a joint programme for solving Bulgaria's worst environment problems. Five teams have been formed of experts of Bulgarian ministries and non-governmental organizations: the Green Party and the Ecoglasnost Association. Various aspects of the environment are being discussed: industrial pollution, environment monitoring, protected wilderness tracts, training of lawyers and economists, and financing rehabilitation programmes.

An air-monitoring system will be installed in Sofia, thanks to a 900,000 Deutsche Marks grant from Germany's Ministry of the Environment.

## CZECHOSLOVAKIA

### Drinking Water Situation Described as 'Critical'

*AU1206092691 Bratislava PRAVDA in Slovak 7 Jun 91 p 2*

[CTK report: "The Quality of Water Is Critical"]

[Text] Brno—Approximately only 40 percent of effluence in the CSFR is treated with appropriate efficiency. To date, many large towns do not have effluence treatment plants. The quality of drinking water is critical. Approximately only 18 percent of inhabitants are supplied with microbically pure water. These statements were made by Jan Mikolas, deputy minister in charge of the Federal Environment Committee, at an international water economy seminar held in Brno yesterday. He said that more than 300 specific projects are now included in the state program for environmental protection. More than 150 experts from the CSFR and Austria are taking part in the seminar. One of the most important commitments made by the two states is that one side cannot take any measures without the agreement of the other (that is, measures that would have an unfavorable influence on water conditions in the territory of the other state).

## HUNGARY

### Briefing on Soviet Army's Environmental Damage

*LD1006161191 Budapest Kossuth Radio Network in Hungarian 1000 GMT 10 Jun 91*

[Text] A briefing has been held in the Ministry of Environmental Protection and Regional Development at which an account was given of the environmental damage caused by the formations of the Soviet army, although figures were not given. Julia Torda reports.

[Torda] The environment has been most polluted at the airports and their vicinity, where a large quantity of

hydrocarbons has got into the soil. Immediate action is necessary in Tokol, Sarmellek, Kalocsa and Debrecen, in order to protect from destruction the uppermost layer of soil, that which supplies water. Rehabilitation of the flora and fauna, and of the landscape in the regions of Nadudvar, Esztergom, Gyor, Tata, Hajduhadhaz, Teglás, Hajmasker, and Veszprem, must begin as soon as possible. The waste and buildings debris must be urgently cleared away from the areas of the barracks in Szombathely, Szekesfehervar, Szolnok, Debrecen, Keskemet, and Budapest.

The damage to the environment is on an enormous scale. In Sarmellek alone, 500,000 cubic meters of soil have been polluted and the quantity of buried dangerous waste, primarily hospital and medical residue, is about 40,000 cubic meters. More than 750 craters can be found in the bombing grounds created near the Hortobagy National Park. This area is like a moonscape.

The results of the surveys completed last Friday were outlined by (Erno Kiss), head of the group of experts which carried out the surveys. According to an agreement concluded in March of last year, the environmental damage caused by the Soviet formations will be deducted from the demands of the Soviet side.

However, what is lacking from the document now made public is how much damage, in total, was caused by the Soviet formations in Hungary. The national data are not being made public for the time being. Secrecy is a national interest. The Hungarian-Soviet intergovernmental talks are beginning today precisely on this, emphasized Peter Szabo, spokesman for the Ministry of Environmental Protection and Regional Development. At repeated urging by the journalists, he nonetheless disclosed that it is a question of a sum of many billion [currency not specified].

## POLAND

### Bielecki Proposes Debt Swap for Ecological Projects

*LD1106171391 Warsaw PAP in English 1253 GMT 11 Jun 91*

[Text] Warsaw, June 11—Polish Premier Jan Krzysztof Bielecki proposed [to] the Paris Club of creditors on Tuesday to further reduce Polish debt by 10 percent and swap it to ecological projects.

The creditor countries grouped in the Paris Club have already written off 50 percent of the Polish debt.

In a letter conveyed today to the ambassadors of the Paris Club countries, the prime minister suggested that a three billion dollar ecological fund be set up under international administration, with about 200 million dollars contributed to it yearly over 20 years.

Bielecki said that it would be the first international initiative in this area on such a large scale, which might set the example for the world how debt problems should be solved.

Under the project, to be politically supervised by Norwegian Premier Gro Brundtland, investment in environmental protection would be carried out on an international scale.

The Polish Finance Ministry assured that the state budget is able to cover costs of the project and assign means in zlotys, equal to the reduced sums in foreign currencies, for the purpose.

If the Paris Club accepts the Polish proposal to swap 10 percent of Polish debt for ecological projects, then the 3 billion dollars gained in this way would go to four priority schemes: reduction of the emission of sulfur dioxide, protection of the Baltic waters, reduction of gases causing the greenhouse effect, and conservation of biological diversity of nature in the regions whose ecosystems are of international value. So far the proposal to create an international ecological fund has been accepted by the United States and France, Minister for Environment, Natural Resources and Forestry Maciej Nowicki told a press conference Tuesday. He said the money coming from the swap would be used for desulfurising installations in Silesian power plants which would

reduce the emission of sulfur dioxide by some 50 percent over the next 10 years. The same money would allow for the construction of waste-water treatment plants along the tributaries of the Vistula and Odra Rivers, which would help reduce the pollution of these rivers and the Baltic by nearly 50 percent over the next 10 years, Nowicki said. According to Finance Deputy Minister Janusz Sawicki, such swap of dollars into zlotys should not increase inflation.

## YUGOSLAVIA

### **Kamenica Dump Radiation Levels Four Times Legal Limit**

*LD0906053791 Belgrade TANJUG Domestic Service in Serbo-Croatian 1248 GMT 8 Jun 91*

[Text] Titov Drvar, 8 Jun (TANJUG)—The latest measurements of radiation levels at a garbage dump in Kamenica, near Titov Drvar, have upset the people of this part of Bosanska Krajina. The Geiger-Miller counter in the hands of experts from Split shows that the level of radiation there is four times the legal limit.

The citizens of Titov Drvar say that this time they will take no chances in the whole affair and that they will do their best to find the cause behind this radiation.



## REGIONAL AFFAIRS

**Developed Countries Use Caribbean as 'Dump Sites'**

*FL1306021591 Bridgetown CANA in English  
2057 GMT 12 Jun 91*

[Text] Port of Spain, Trinidad, June 12, CANA—Trinidad and Tobago is not interested in accepting—for disposal or recycling—waste from developed countries, Environment Minister Lincoln Myers has said. And he urged developing countries in the Caribbean to resist attempts to use the region as "dump sites" for waste.

"... There was an attempt by a firm from the United States, exploring the possibility of getting an incinerator established in Trinidad and Tobago to incinerate liquid and solid waste from the United States of America," the minister said. "This offer, you may be pleased to know, was rejected."

Myers said a document prepared by the environmental watchdog, Greenpeace, for the Caribbean Environmental Programme of the United Nations Environment Programme indicated that there were 21 deals last year to import a wide range of waste in the region.

He said trends which have been noted include the increased number of requests to Caribbean countries to accept garbage or ash generated by municipal garbage incinerators from major cities in America, and European chemical industries trying to export hazardous waste to the developing world. Myers said there was also an increase in the activity among waste traders to offer lead waste from the USA on the claim that it was useful raw material for recycling, construction, or road-building.

Myers was addressing a workshop on the management of hazardous wastes organised by the Commonwealth Science Council and the Institute of Marine Affairs.

## BAHAMAS

**Cause of Conch Contamination To Be Investigated**

*FL1306170991 Bridgetown CANA in English  
1645 GMT 13 Jun 91*

[Text] Nassau, the Bahamas, June 13, CANA—Bahamian seafood vendors, hard hit by a drop in sales, are pressing the government to find out what is causing a poisoning epidemic in the conch population. On Wednesday, they converged on downtown Nassau in a demonstration against the Ministry of Health.

They complained that as a result of statements by the ministry sales have dropped by 90 percent, resulting in "unnecessary financial hardship, suffering, frustration and, in some cases, starvation." They want the ministry to conduct an intensive investigation to eliminate the contamination problem.

"The elimination of this problem lies in your ministry pinpointing precisely where the problem is. Once this is done, we will be expecting your ministry to restore the public confidence to purchase conchs through the press and media," they said in a letter to Health Minister Charles Carter.

Carter, who spoke with vendors on his way to the House of Assembly, said that in the last month, 506 cases of food poisoning had been recorded at the state-owned Princess Margaret Hospital. Between May 10 and May 31, 144 people were treated for poisoning, 52 conch-related. But during the first 10 days of June, there were 362 cases of food poisoning, 90 percent of which involved conch, said Carter. Doctors Hospital, a private hospital in Nassau, and private doctors have reported a large increase in the number of food poisoning cases.

Carter withdrew an earlier statement that the epidemic was due to salmonella, the bacteria causing gastroenteritis and sometimes dysentery. He said that conch samples have now been sent to Florida, and that the Pan American Health Organisation has been invited to take part in an investigation.

Carter said the ministry was trying to devise a solution to protect health standards while allowing vendors to continue to sell conch. He stressed that it is not the ministry's intention to harm anybody's livelihood. A meeting between vendors and health authorities was set for today.

The opposition Free National Movement [FNM] toured the Potter's Cay fish market Wednesday. Spokesman Pierre Dupuch said that the FNM had been warning the government about the level of sewerage in Nassau Harbour since 1982, but that the response had been inadequate. He said the problem could have been avoided had adequate steps been taken.

Carter has said pollution in the harbour is a critical cause for concern, but did not identify it as the source of contamination. He said the contaminated conch came from other areas of the Bahamas.

## BOLIVIA

**Experts Report 30 Percent Annual Decrease in Forests**

*PY1006165091 Buenos Aires NOTICIAS  
ARGENTINAS in Spanish 1640 GMT 9 Jun 91*

[Text] La Paz, 9 Jun (AFP-NA)—A yearly deforestation rate of 200,000 hectares has resulted in a 30 percent decrease in Bolivia's forest area, according to a report drafted by experts of the Chamber of Deputies Environmental Committee, which is drafting an ecological protection law.

The report, which was released today, adds that reforestation has replaced only .25 percent of the total forest area that has been irrationally depredated by colonists

and by some legal lumber firms. It also states that due to this, average annual erosion will reach 1,000 hectares throughout Bolivia's forest area, which covers 558,423 square km, [or] 51 percent of the national territory.

At the same time, protected regions amount to only five percent of the territory; moreover, the report adds that this protection is more theoretical than actual.

Official estimates state that a total of 200 lumber firms in the country produce an average 110,000 cubic meters of high-quality wood, 70 percent of which is exported.

## BRAZIL

### **Zelia's Exit Seen To Favor Environmental Sector**

91SM0327Z Brasilia CORREIO BRAZILIENSE  
in Portuguese 10 May 91 p 15

[Text] Ambassador Marcilio Marques Moreira's appointment as minister of economy has given new encouragement to this country's environmental sector. That revelation was made yesterday by Eduardo Martins, the assistant secretary for the environment, who felt that Minister Zelia Cardoso de Mello's team was insensitive to the environmental cause, his reason being that nearly all the funds for that sector are being withheld.

The secretary, who presided over the special meeting of the National Environment Council (Conama) held to discuss environmental policy from 1990 to 1995, emphasized that because of his activity in the diplomatic field, the new minister was aware of the importance of the environmental sector and even familiar with some projects.

Eduardo Martins emphasized that a new effort would be made to persuade the new team to deposit Brazil's counterpart funds for the National Environment Plan (PNMA). Brazil is paying a rate of 0.75 percent per year on the \$117 million borrowed from the World Bank (IBRD [International Bank for Reconstruction and Development]). The bank has been releasing funds for the past three months, and the environmental sector has not demonstrated the ability to spend it.

The funds making up the National Environment Fund (FNMA) are another sector encountering various problems because the money is being withheld. Thirty-eight projects totaling 1 million cruzeiros have already been approved by the Fund, but they are waiting for the money to be released by the administration's economic team. In Martins' opinion, the standstill in the FNMA is not productive, considering the FNMA's demonstration value. But since the team decided to deal with all areas in a linear fashion, the projects are experiencing delays in their scheduled implementation.

Martins also cherishes the hope that discussion concerning the possibility of converting part of the foreign debt into environmental projects will be reopened in the

near future, considering that the debate did not even come up under the previous economic team.

During the special meeting by Conama, the concern felt by state environmental secretaries over the restoration of tax incentives for agricultural and stockraising projects in Amazonia was made clear. Although the regulations governing those incentives stipulate that there must be ecological economic zoning, the secretary in Maranhao, Fernando Cesar Mesquita, said that several projects were under study by the Authority for Developing the Amazon Region (Sudam) without zoning.

Mesquita said that the region in question is necessarily having to deal with serious problems such as gold prospecting, silting, and deforestation that must be taken into account in any decision concerning agricultural projects.

Another problem given prominent attention during the meeting was the complaint by many state secretaries that IBAMA [Brazilian Institute for the Environment and Renewable Natural Resources] was not refunding 40 percent of the total reforestation tax collected by each state. According to the institute's press office, the lack of funds has led IBAMA to use that money for projects regarded as priorities, with the result that the tax has not been returned to the states where it was collected.

The main purpose of the special meeting wound up being relegated to the background, since in Fernando Cesar Mesquita's opinion, the country has so many environmental problems that discussion of a new policy is not all that important and may in fact be a means of playing for time rather than finding immediate solutions.

Carlos Cardoso Aveline, representing the Union for Protection of the Natural Environment (UPAN), which is an association of 595 environmental organizations, even suggested the drawing up of a motion asking that environmental matters be taken away from the Secretariat for Strategic Affairs (SAE). His suggestion was rejected by the assistant secretary, Eduardo Martins, who feels that concern over the sector's militarization is wrong and does not help Conama in the long run.

### **Document Reveals Government Plans for Amazon Region**

PY1506144691 Sao Paulo FOLHA DE SAO PAULO  
in Portuguese 11 Jun 91 Section 1 p 10

[By Gilberto Dimenstein and Sonia Mossri]

[Text] FOLHA obtained a confidential document by the presidency of the Republic explaining the bases of a proposal for the Amazon that the government will present to the UN World Conference on the Environment, Eco-92. The proposal calls for the creation of a tax on the exploitation of natural resources in the region.

The document "Government Action in Amazon—Subsidies for Ecological-Economic Zoning and for the

Amazon Development Plan," was prepared by the Regional Development Secretariat. The document explains government policies for the region until year 2000. The document also contemplates more than \$120 billion in public and private investments in the region.

The investments contemplated by the government plan surpass the foreign debt (\$115 billion). The document projects investments of \$45 billion between 1991 and 1996 and of \$75 billion between 1996 and 2000. One of the document's main proposals is the creation of a tax on economic exploitation of natural resources through an extension of the constitutional concept of royalties for subsoil resources.

The tax proposal coincides with a government plan to give priority to investments in biotechnology, chemistry of natural resources, and tropical agriculture.

According to the presidential report, the Amazon is the world's largest source of pharmaceutical, biochemical, and agricultural [agronomos] products. Nearly 30 percent of the world's genetic stock is concentrated in the region.

Policies in the region will be defined through ecological-economic zoning that will be coordinated by the Strategic Affairs Secretariat [SAE]. The basic goal of the zoning plan worked out by the Institute of Space Research is "to fight the indiscriminate clearing of the Amazon by penalizing projects and investments that use such a procedure."

The zoning plan has already defined 22 priority areas where the government should encourage public and private investment. The proposal that the government will present at Eco-92 promises to implement the difficult task of rationalizing economic development with environmental protection.

The report "Government Action in the Amazon" calls for the creation of forestry centers where economic exploitation activities would be confined. The government also promises to expand extracting, biological, and ecological reserves.

The proposal also considers the problem of illegal miners, who have frequently clashed with Indian communities. The document considers it essential to control the miners' activities through the demarcation and control of mining areas.

As designed by the Regional Development Secretariat, the model for the Amazon in the year 2000 is based on the electric-electronic and mineral-metallurgical industries and the exploitation of natural resources.

## CHILE

### Degree of Santiago Area Pollution Summarized

91WN0478A Santiago LA NACION in Spanish  
2 May 91 p 20

[Text] The Santiago metropolitan area of Chile is in the process of becoming one of the most polluted urban areas in the world, according to a recent ECLA [Economic Commission for Latin America] report.

The degree of air and water pollution constitutes a warning as to the harmful effects that can result from certain deregulation practices and the application of inappropriate rules.

The metropolitan region has a population of 5.1 million, 40 percent of the nation's population, while occupying only two percent of the country's continental area.

The population density is 334 inhabitants per sq km, in contrast with an average of only 17 for the rest of the country.

The area's topographical and climatic features contribute to the accumulation of particles and polluting gases over the city, particularly in the wintertime. In addition, there has been a spectacular increase in emissions of polluting gases.

Based on international standards, levels of toxic concentration in the atmosphere have in recent years far exceeded values compatible with human health.

In 1988, there were 300,000 additional cases of bronchopulmonary diseases recorded at hospitals and clinics in Santiago (53,000 cases of bronchopneumonia, 40,000 of obstructive bronchitis, 110,000 of flu, colds, pharyngitis, and other related conditions), basically caused by atmospheric pollution.

By way of example, one has but to point out that over the past three years, the number of private automobiles in Santiago has risen 10 percent annually, totaling nearly 450,000 in March 1990.

At the same time, the number of vehicles used for public transportation doubled between 1980 and 1988, going from 6,000 to 12,000, mainly because of the policy of deregulation promoted by the previous administration.

Along with a deregulation of rates, that same policy sanctioned the freedom to engage in the activity, set routes, define the number of vehicles to be used on each line, and determine the frequency of departures.

The result was an enormous concentration of public vehicular flow on the most profitable routes, with an extraordinarily low rate of passengers per vehicle and slower traffic which in turn increased the emission of pollutants.

The situation was further aggravated by an order freeing the importation of used spare parts, while the increase in

the vehicle pool, mainly for mass transit, ended up depending to a large extent on the incorporation of older, heavily-polluting engines.

A study conducted in 1985 found that 71 percent of all inhalable particles came from diesel vehicles (nearly all of them used for mass transit).

Measurements done in the winter of 1989 revealed that the amount of carbon monoxide was triple the international environmental norm, while counts of inhalable particles exceeded it by as much as nine times!

Given the gravity of the problem, the rationale for absolute deregulation began to crumble. Consequently, toward the end of the previous administration, a few restrictions were timidly introduced which also turned out to be insufficient and ineffective: Not only was the problem not checked, but it continued to worsen!

In March 1990, the new democratic government designed a cleanup plan. The efficacy of its measures remains to be seen. The winter of 1991 is the unavoidable scenario for the next evaluation.

#### Waste Contaminates Marine Products

91WN0484A Santiago EL MERCURIO in Spanish  
2 May 91 pp A1, A11

[Report by Haydee Rojas]

[Text] Chile has a coastline of more than 4,200 km. But few realize what an advantage this is. The potential of the zone is extremely high, and yet at the moment its use is quite restricted, to say the least. Our waters have become a garbage dump, as they are considered the best place to discard unlimited amounts of wastes.

And this is directly related to the contamination of marine products.

The problem, which has been made worse by the pandemic of cholera that has struck part of the continent, is not new. Specialists in the field have been sounding the alarm for several years already.

Alberto Reyes, a marine biologist with a master's in ecology, notes that the problem is not new. "The issue has come into vogue now. We have been talking about it for quite some time already."

The situation that we have described affects not only Chileans. Over the past 10 years several countries have signed regional agreements to ward off the dangers of pollution. Standards have been established to preserve and conserve marine ecosystems and prevent them from deteriorating.

#### Contaminated Shellfish

If fish and shellfish were not eaten before, today their consumption is limited to those that can be cooked. Eating them raw is out of the question. Cholera has

spread panic among the populace, and this has caused the sales of these items to decline considerably, those who market them assert.

Reyes explains that the sea cleanses itself naturally; that is to say, it "absorbs" contamination. But if the amount of pollutants exceed this capacity, wastes begin to build up. "This is where the problem starts, because even though the seas have this ability, the organisms that live there accumulate the pollutants inside them. This is because mollusks get their food precisely by filtering particles that are in the water. Among them are clams, piures, razor clams [machas], mussels, and oysters, which because of their low degree of mobility are constantly opening and closing their shells and in contact with the water. Those that are not filterers, such as fish, feed off the former, thus forming a chain."

Juan Cancino, a professor of ecology at Catholic University, explains that an 8-centimeter mussel filters between 10 and 15 liters of water an hour. "Since they are processing a large amount of water per unit of time, they are capable of removing all of the particles and gradually concentrating them."

This specialist points out that by and large, banks of mollusks are near the shore, and therefore they are hauled up from there, precisely where waste water is dumped; thus, they are readily contaminated. This also depends on the size of the mollusk, because the larger they are, the greater their water-filtering capacity, "increasing the chances that they are infected."

#### Damning Studies

A study conducted by the Medical Research Center of Catholic University also indicates that the main risk factors for enteric or transmissible diseases are the consumption of fresh shellfish and swimming at the beach. Dr. Pablo Vial, a virologist with this center, explains that research into type A and E viral hepatitis conducted in Iquique, Santiago, and Punta Arenas showed that a high percentage of the 3,000 respondents had indeed eaten fresh shellfish before developing the disease.

Meanwhile, swimming at the beach is also a risk factor, since a person swallows an average of 50 cubic centimeters of water with each submersion, whether he closes his mouth or not.

Dr. Vial indicates that although the facts are telling us that the chances of getting sick are good, people are not reacting rationally and do not realize that we can catch something.

As for the ways of eliminating the bacteria that are present in the mollusks, Vial says that most die at high temperatures, that is to say, above 100 degrees Celsius, maintained for no less than 10 minutes.

One piece of information: the bacteria would not be killed in "razor clams a la parmesana" because not enough heat is used.

According to an investigation conducted by the Vina del Mar Health Service, there was an increase of 38 percent in the cases of hepatitis in that area during the summer months compared to 1990.

### The Root of the Problem

A study performed in 1984 by the Fishing Promotion Institute (IFOP), a branch of Corfo [Production Development Corporation], identified the main sources of contamination off our coast, as well as the amounts of wastes and the areas affected. It found that most of the pollution is caused by discharges of household waste water that goes directly or indirectly into the sea.

We know that only three percent of waste water is treated. The rest goes into the sea as is.

These waters have a high organic content, including pathogenic microorganisms that can impair our health if we consume raw or insufficiently cooked seafood or swim off these beaches.

This research specified that the situation is most critical along the coasts nearest the most heavily populated areas and at the mouths of certain rivers, where the presence of fecal coliform bacteria exceeds the maximum levels allowed by Chilean law. This is 1,000 coliform bacteria/100 milliliters (ml.)

The hardest hit population is in the Fifth Region, because of the direct discharges from Valparaiso and mainly Vina del Mar and the indirect discharges through the Aconcagua, Maipo, and La Ligua rivers and the Marga-Marga Brook. The situation is similar in the Eighth Region, in the Talcahuano and San Vicente sections.

But although this is the main source of contamination, others must be considered as well. We are talking specifically about industrial wastes, primarily from the large mining companies, in the form of tailings or surpluses from the copper-refining process, which discharges large amounts of chemical compounds into the sea. This has seriously affected the coastal area of the Second and Third regions. The cellulose and fishing industries are not unrelated to the problem.

Rolando Kelly, a naval architect with a master's in oceanography, explains that the situation described in the 1984 IFOP study has not changed at all. "The trends are the same seven years later."

In his judgment, our coastline is still largely uncontaminated, even though there are individual pockets where the problem is serious. This is because pollution affects the large urban coastal centers, of which there are not many. "Chile is a lightly populated country; much of its

coastline is deserted. This does not mean that the situation is any less serious, but the point is not to exaggerate either. These are the facts," he asserts.

Julio Monreal, an engineer with the Health Ministry's environment departmental, indicates that for many years now the department has been conducting periodic quality checks on the fish and shellfish sold in the country.

"There are 20 food-testing laboratories up and down the country that do this work, in order to ascertain whether they contain fecal contamination," he says.

He adds that their concern is not only that shellfish be taken from unpolluted areas but also that it not become contaminated afterwards. Five years ago, for example, they closed down the hatcheries in the Seno del Reloncavi area in Puerto Montt, which was contaminated.

### Supermarkets Doing Well

And what is the situation at supermarkets? Eugenia Damm, the head of the quality-control department at Unimarc, says that 99 percent of the shellfish that their stores sell are bought at the Fishing Terminal from suppliers who take them from uncontaminated areas of Castro and Quellon.

Right now they are selling only fish, no shellfish, which consumers prefer in cans, since they are sterile and thus not a problem, she says.

The marketing manager of Hipermercados Jumbo, Claudio Haase, says that they have been working for several years on the quality of fish and shellfish, above and beyond the problems that have arisen today. "We have decided to buy a large portion of our merchandise directly from suppliers in the south of the country, specifically Melinka and Valdivia, and some items at the Fishing Terminal that are from well-known suppliers."

In Haase's judgment, the fish and shellfish production company is not working the same as it used to. "The farming of species far away from urban areas where waste is dumped into the sea or from fishmeal plants has become customary now. Even those that export part of their output are subject to tight quality controls," he indicates.

As far as this executive is concerned, besides the product coming from an uncontaminated area, the transportation should also be efficient, in other words, in suitable vehicles at optimal temperatures. And to this must be added keeping the product fresh at the retail stores. "We have tanks of filtered fresh and salt water that are bathed in ultraviolet light, which purifies the water. This enables us to keep the products in a practically natural medium. The fish are brought here alive and are kept that way until they are sold."

The retailers clarify that owing to the problem the country is currently having, the instructions prescribed



by the health authorities for consuming cooked seafood ought to be followed, even if their source is clean.

### **Pollution Leads to Restrictions, Closures in Santiago**

*PY1506022691 Madrid EFE in English 2300 GMT 14 Jun 91*

[Text] Santiago, June 14 (EFE)—The Chilean government Friday [14 June] ordered schools and factories to close and restricted traffic in a bid to disperse the smog hanging over the capital that each winter turns Santiago into one of the world's most polluted cities.

The emergency measures cut traffic in the capital by 40 percent, shut down 188 factories and closed all kindergarten and primary schools in the capital, and ordered the sick, the elderly, pregnant women and all children under three to remain indoors. A similar ban is to be imposed Monday, with the number of cars on the capital's streets expected to be cut by 20 percent.

The smog becomes particularly acute between the winter months of May and August, when the Andes and a coastal mountain range that enclose Santiago shut out the winds which normally clear the black clouds hanging over the capital.

Scientists say the winter phenomenon transforms Santiago into the world's third most-polluted city after Mexico City and Sao Paulo.

## **CUBA**

### **Claims That Cuban Nuclear Power Station Is Unsafe Rebutted**

*PM1206211591 Moscow IZVESTIYA in Russian 13 Jun 91 Union Edition p 5*

[V. Khovratovich report: "Deserters Do Not Always Tell the Truth"]

[Text] The nuclear electric power station in Cuba will be safe, Soviet nuclear scientists assured journalists at an information meeting held at the USSR Foreign Ministry Press Center. Such a meeting was prompted by numerous articles in U.S. newspapers citing statements by Cuban specialists who worked on the construction of the "Juragua" Nuclear Station and fled to America several months ago. They maintain that the Soviet equipment arriving in Cuba for the nuclear electric power station does not meet all the safety regulations which must be observed in stations of this type.

"But this is a fabrication, to say the least," Ye.I. Ignatenko, a senior official of the USSR Ministry of Atomic Power Engineering and Industry, said at the meeting. "The 'Juragua' Nuclear Electric Power Station project is a modernized version of the Soviet nuclear electric power station project at Lovisa in Finland, which during 14 years of operation has steadily been among the

world's best nuclear electric power stations in terms of its technical and economic indicators, including the operational reliability of the equipment and the technological systems. In addition, the Cuban project takes account of that country's specific conditions: the increased seismicity, the effect of hurricanes or tidal waves, and the humid tropical climate. Account has even been taken of the likelihood of an aircraft falling on the nuclear electric power station."

Does all the aforesaid mean, IZVESTIYA's correspondent asked, that there exists a so-called export version of nuclear stations which is qualitatively different from, let us say, the Chernobyl Nuclear Electric Power Station?

"The Chernobyl station, as well as the other first Soviet stations," Ye.I. Ignatenko said, "had one very serious shortcoming—they did not have a hood over the reactor. It is this—which, incidentally, is projected for the Cuban nuclear electric power station—that makes it possible to achieve the utmost safety. Even if some accident does happen, no one and nothing outside the station will suffer."

## **HONDURAS**

### **Capital's Mean Annual Temperature Up 1 Degree Centigrade**

*91WN0452B Tegucigalpa LA TRIBUNA in Spanish 27 Apr 91 p 16*

[Article by L. B.]

[Text] In the absence of governmental policies designed to halt ecological destruction, inhabitants of the capital will be compelled to endure unbearable heat and drought.

The capital's mean annual temperature has risen one degree Centigrade and its annual rainfall has declined by 44.3 liters per square meter in the last 30 years.

The foregoing data recorded by the National Weather Service [SMN] scientifically justify the protests of those who say that "Tegucigalpa is not the same as before."

Although the heating up of the atmosphere is a worldwide phenomenon, the head of the National Weather Service, Nabil Kawas, said that "speaking of averages, the increase of one degree Centigrade is cause for concern because, even though it seems small, it is significant."

He added that the rise in temperature has proceeded with greater intensity since the 1970's, but has been felt more in recent years owing to other factors such as destruction of the ecological system.

Climatic heating is one of the more serious consequences of the different forms of contamination of the atmosphere, and according to the experts in this field, it involves an imbalance in the earth's radiation.

To date, the average worldwide change is 0.5 degree Centigrade, and in the Honduran capital it is double that value, since a disordered increase in population, construction areas, smokestack industries, automobiles, and destruction of the vegetation, all add to the general causes.

"With the heating of the atmosphere, evaporation increases and forms a cloud barrier that prevents the escape of the energy released by the earth at long wavelengths at night. This barrier reflects the energy back down to Earth and prevents cooling," explained Pedro Barahona, SMN head of climatology.

Barahona said that the increase in temperature is significant throughout the country and that, for now, Tegucigalpa's has been analyzed because "it is where causes are more pronounced."

#### Changes Are Abrupt

Year	Minimum Low (Degrees C)	Minimum High (Degrees C)	Maximum (Degrees C)
1951	5.0	14.7	32.7
1960	8.3	16.1	34.4
1970	6.4	16.2	34.9
1980	6.4	18.4	33.8
1990	9.3	16.5	33.5

—The capital's highest recorded temperature to date, since 1951, has been 39.5 degrees C, in March and April of last year. This marks a climate similar to that of San Pedro Sula.

—The data recorded during the last four decades reflect a mean temperature rise of 1 degree C for Tegucigalpa. According to the experts, "in terms of percentages, it is significant."

—This year, March has posted an absolute temperature of 35.0 degrees. This month it has reached 35.6 degrees, and if the current ecological destruction continues, there can be no question that the temperature will continue rising until the city "resembles an inferno."

In cities like Tegucigalpa, the change of temperature has also produced changes in the lives of its inhabitants. Proof of it is that, after many Christmases of protecting themselves from the cold, they now have to use cooling fans.

"Undoubtedly, the use of electricity in homes and, above all, in factories and offices, is now greater, besides which, activities such as construction now require additional measures, increasing their costs," said Barahona.

Over the past 30 years, Tegucigalpa's annual rainfall has averaged 159 millimeters. During the 1980's, however, this average dropped to 115 millimeters.

Meanwhile, the question of "who takes care of the resources and security of Honduras" remains in the air.

#### 'Enormous' Forest Fires Burn Unopposed

91WN0452A Tegucigalpa EL HERALDO in Spanish  
23 Apr 91 p 30

[Text] Major expanses of forests in the departments of Olancho, Yoro, and Colon are at this moment being subjected to enormous fires that are consuming vast stretches of lumber trees, with no action being taken by private or government organizations to extinguish them.

The Aguan valley and surrounding hills have been burning for several days. The same is happening with forests located along the road from Sava to Olanchito that connects Juticalpa with the capital, via the towns of Carrizal, La Union, Salama, and Limones in the Department of Olancho.

Farmers and cattlemen have added to the destruction by felling trees in forests on mountains along the recently built road from Rio Mame to La Union, where fires are also destroying extensive areas of pine and broad-leaved trees.

In El Carrizal, where the Honduran Corporation for Forest Development has an office, the fires extend to within a few meters of a town, with no interest being shown by the person in charge of the office in putting out the fires, which have destroyed tens of kilometers of forest.

Fires are also raging in the forests between Limones and Campamento, where at night the trunks of pine trees can be seen burning, owing to the spreading of fires that are being set by still-unidentified persons.

No one has shown interest in putting out the fires that are devastating these vast expanses of forest in the departments of Olancho, Yoro, and Colon, and seriously damaging the ecology and economy of the nation.

#### 1,702 Forest Fires Consume 26,342 Hectares

91WN0452C Tegucigalpa EL HERALDO in Spanish  
26 Apr 91 p 54

[Article by Fredy Guzman]

[Text] The capital of the Republic, formerly surrounded by beautiful pine forests that produced a mist and a very pleasant climate, is now enveloped by a dense layer of smoke being generated by 1,702 forest fires recorded since the beginning of the year.

A few years ago, inhabitants of the twin cities, Tegucigalpa and Comayagua, breathed air not contaminated as now; and temperatures never rose higher than 28 degrees centigrade during the summer, contrasting with current temperatures of 32 degrees C and higher.

The felling of trees and the forest fires near the capital have turned Tegucigalpa and Comayagua into desert zones, with suffocating heat, and no hopes of reforestation within the medium term.

For the past several days, the capital has been enveloped in a layer of smoke stemming from the agricultural burning of fields and the raging forest fires throughout the country; and the resulting poor visibility has compelled many airlines to cancel morning flights.

Technicians at the Weather Service Office in this city explained that this is not fog—which consists of suspended particles of salt in coastal areas and dust in the interior of the country—but actually a layer of smoke produced by forest fires.

German Blanco, the weatherman on duty, said that the thickness of the smoke layer over the city reaches altitudes ranging between 5,000 and 7,000 feet.

Blanco said that this smoke layer extends throughout Central America, as a result of which, airports throughout the region are having to cancel flights because of poor visibility.

He cited as an example that at the Toncontin airport, where normal visibility is 24 km, it is currently down to 900 meters in the morning.

Owing to the deforestation, high temperatures are being recorded during the dry season. This is the case in San Pedro Sula, whose inhabitants have been enduring temperatures as high as 41 degrees C.

Based on the sun's position, with its rays falling perpendicular to the earth, it is believed that temperatures will continue high for the next several days.

When the earth heats up abnormally, winds rise, dragging microscopic particles up with them, and forming droplets that develop into uprushes, causing rainstorms called "chubascos," accompanied by thunder and lightning storms.

Weather personnel said that if it does not rain, and wind velocities do not increase, the smoke layer will remain stationary in the sky over Honduras.

Currently, wind velocities are reaching a maximum of 10 knots. In order to dissipate the smoke layer and also ventilate the city, they must reach between 15 and 20 knots.

According to information provided by the Honduran Corporation for Forest Development [Cohdefor], 1,702 forest fires have occurred between 1 January and 22 April of this year, destroying 26,342 hectares of forest.

Representatives of the Corporation said that they are concerned by the growing number of fires since the beginning of the year, and promised to double their efforts to decrease the burning of the national flora.

Fire-fighting authorities said that they are working together with Cohdefor and the Armed Forces to combat the fires.

Lieutenant Frank Medina, official spokesman for the fire fighters, said that they are having to control some 10 fires a day in empty lots in the city.

Many Hondurans are asking where the Armed Forces Green Battalions are that were assigned the mission of fighting the forest fires and initiating the replanting of Honduran forests.

Early on, it was thought that the number of forest fires would be reduced by activity on the part of the Green Battalions. But the growing number is alarming and, day by day, Honduras is turning into a desert.

The Army's official spokesman, Napoleon Santos, said, however, that "30 or 40 percent of our people are dedicated to putting out fires, together with personnel from Cohdefor and the Ministry of Natural Resources."

He emphasized that controlling forest fires is the obligation of all Hondurans, and stated that during the winter season, military personnel will be assigned to the work of reforestation.

Meanwhile, the inhabitants of the capital face a future that is none too bright, in that, the unmerciful destruction of the forests involves a progressive contamination of the environment, depletion of water resources, and a proliferation of diseases.

## NICARAGUA

### Benefits of Reforestation Program Explained

91WN0471A Managua LA PRENSA in Spanish  
7 May 91 p 4

[Article by Rosendo Diaz Bendena]

[Text] The extent of deforestation or cutting of the trees, has been going on and accelerating during the past 10 years in this country. This is astonishing, incredible, and unheard of. It has left the whole area of the Pacific coast and part of the central area of the country totally deprived of trees of any kind.

The Sandinistas made a great show of establishing the IRENA [Institute of Natural Resources]. This organization was turned into a sad kind of "manager" which collected from whomever it could for the felling of trees and which never could or wished to undertake a massive plan of forestation to compensate for the merciless cutting of trees for firewood and use in construction and for housing purposes in the country.

When the present government was inaugurated, a program for housing and another for reforestation were proposed as part of an urgent employment plan, in view of the immediate, mid-term, and future benefits which such programs would provide for the recovery of economic activity in the country.

When we learned that the AID [U.S. Agency for International Development] had placed at the disposition of

the government about \$10 million for an employment program at the municipal level, we tried to convince those who decide and take action in the country of the usefulness of combining the reforestation program with the employment program in the cities of Nicaragua.

If we compare the advantages of the present employment plan with the one involving reforestation, we find that the former program brings work and offers progress to the cities: paving streets, repairing schools and hospitals, etc. However, when the money runs out, the work also comes to an end. In other words, this is a short term program.

On the other hand, the reforestation program, in addition to providing work in the same cities, would offer the following, additional benefits:

- (1) Definite, permanent, and long term work, which no other program provides. The sale of plants for reforestation would imply the continued replenishment of the capital originally invested. Therefore, it would mean the indefinite continuation of the reforestation program.
- (2) An end to the human exodus from the countryside to Managua. As a consequence of permanent and long term employment, the exodus of farmers to Managua in search of a better life would be minimized. And perhaps we would even succeed in returning many of the farmers to their place of birth.
- (3) Means of production and additional work. As reforestation would involve planting trees for firewood, fruit, and lumber for construction and for commercial purposes, this would produce additional sources of income and employment in the area.
- (4) Saving on foreign exchange. By producing firewood for cooking purposes we would be saving on foreign exchange spent for cooking gas, which would be replaced by the use of firewood.
- (5) Improvement in the atmosphere. Planting trees along the streets, roads, and highways within the cities, as well as conserving the soil and protecting sources of water and the banks of rivers and lakes would be a logical consequence of the same program by increasing to this extent the demand for manual workers who now are unemployed.
- (6) And so forth and so on.

Unquestionably, this reforestation program would be supported by an appropriate law, like the law which formerly existed in this country, requiring all owners of country estates to plant a minimum number of trees for each block of his property. The state would be the principal supplier of the plants. However, private enterprise could compete in the production and sale of plants, if their quality and prices were competitive.

Since the program as such is nothing new, this concern has been expressed through different channels to national and international organizations (such as MAG

[Ministry of Agriculture and Livestock], IRENA [Institute of Natural Resources], FISE [International Federation of Teaching Trade Unions], AID, Interforest [International Forest Agency], the Office of the Mayor of Managua, etc.), where it has had a generally favorable reception. However, it has not been possible to schedule this program due to a lack of coordination.

All that is required is a little will on the part of those involved to ensure adequate coordination to formalize this program, which is a prime necessity, since there are sufficient funds to undertake it.

This new government is guilty, due to its heritage from Sandinism, of holding many working sessions, conventions, and sterile meetings which have produced no immediate solution to the fundamental problems of the country. What is basically required is ACTION. However, there is no determination to do this, only indecision.

It is now past the time for us to stop standing around idle and to go to work in a united, coordinated, and efficient way, for our own benefit and that of this country where we live, whether we like it or not.

#### **Pollution, Soil Erosion on Atlantic Coast Noted**

*91WN0471B Managua EL NUEVO DIARIO  
in Spanish 18 Apr 91 p 2*

[Excerpt] [passage omitted] On 17 April, at the Fourth Workshop organized by the Universidad Centroamericana [Central American University] the subject of "Economic Rights and Natural Resources" was debated. Participating in the discussions were Steadman Fagoth, from the Autonomous Region of the North Atlantic; Johnny Hodgson, of the RAAS [Autonomous Region of the South Atlantic]; Vladimir Perez, from the MAN [National Action Movement]; and Jorge Jenkins, a sociologist.

Before discussing all of the anomalies which are found in the waters of the Atlantic Ocean, Hodgson described some experiences with natural resources which have been recorded in the RAAS. He said: "The hope of the people living along the coast is to be able to become first class citizens. However, to do that, it is necessary to establish the necessary conditions."

According to Hodgson, the territory coming under the RAAS includes 15,346 km of coast, to say nothing of parts of the ocean. Of this land, 53 percent is largely planted to forest, 14 percent is used for agriculture, and 33 percent has a potential for raising livestock.

Regarding the sea, Hodgson explained that the waters adjoining the Atlantic coast are biologically the most productive of the entire Caribbean Sea area. To bring out the fact that this resource is one of the principal sources for economic and social development in the Autonomous Areas, he said: "The continental shelf is the broadest and most extensive in the world."

Hodgson said that, according to the research which has been carried out, it is possible to extract the following quantities of seafood annually: 8.5 million pounds of crayfish and shrimp and 236,000 tons of different kinds of fish. The coastal leader said: "All of this can be done in a rational and sustained way."

Regarding the subsoil, Hodgson emphasized that the greatest expanse of wet, tropical forest in Nicaragua is found on the Atlantic coast.

In discussing the situation which the country is facing due to the inadequate use of its natural resources,

Vladimir Perez pointed out that there is a serious problem regarding water, since "we have not found a source of water which does not have a certain level of contamination." On the other hand there are surface sources of water which are already drying up.

Soil erosion is also a source of concern, due to the misuse and irrational exploitation of the land. Regarding air resources, Perez said that we are receiving carbon monoxide contamination from neighboring countries. Regarding the fishing industry, he said that it is being destroyed by drug traffickers.



## REGIONAL AFFAIRS

### War Damage to Gulf Evaluated

91WN0428A London AL-MAJALLAH in Arabic  
24 Apr 91 pp 42-47

[Text] Cairo—The effects of the disaster caused by the oil fires in Kuwait and the discharge of millions of barrels of oil into the sea will last for decades and will affect the entire world. These effects are damaging the Gulf region directly by destroying marine life. Also, water desalinization operations, on which the Gulf countries depend for their drinking water, are being shut down to lessen the risk of different nervous diseases and cancers in human beings. About 600 oil wells are discharging thousands of tons of black smoke and toxic gasses into the atmosphere, affecting the global climate, human health, and the environment. The disaster caused by the increase in this soot will continue for years, until the well fires are extinguished, a process requiring enormous capital which is expected to drain Arab resources.

Regarding the environmental destruction and its current and long-term effects, AL-MAJALLAH attempts in this report to establish all the facts and create an accurate picture of the disaster based on interviews with scientists and experts in different fields.

Dr. Ahmad Sayyid Mursi, a professor of water pollution at the National Research Center, an environmental advisor to the Egyptian oil minister, and a member of the permanent committee to prevent oil pollution of sea water, stated that the volume of oil that has flowed into the Gulf is not known precisely. However, it is no less than several million tons. During the first six days, this amount was estimated at about a million tons of crude oil, inasmuch as the diameter of the pipe through which the oil was discharged into the Gulf by Iraqi forces was 48 inches, and the rate of pumping from it is 8,000 meters per hour without the use of pumps, and 20,000 meters per hour with the use of one or two pumps. He emphasizes that it is difficult to estimate the quantity of oil that has flowed into the Gulf to date, because it is difficult for specialists to reach the area due to the presence of mines in the sea and on land.

Regarding what happens to the oil after it flows into the water, he indicates that, with the dispersal of this oil over wide areas in the Gulf, under the effect of winds, waves, and maritime currents, the oil moves toward areas near the source of the pollution. It is known that the direction of the prevailing wind in this area is northeastern. Consequently, it is expected that the oil spots will move toward the south and the southwest and will therefore reach the coasts of Southern Kuwait, Saudi Arabia, Bahrain, Qatar, and the United Arab Emirates. In addition, the oil will be deposited on the coasts. With the spread of large amounts of oil in the Gulf, light oil material subject to dispersal at low temperatures will evaporate. There are numerous compounds that disperse in the first hours [of the day], depending on the prevailing air temperature in this period.

### Three Lethal Forms

Following the spread of the oil in the water of the Gulf, it assumes three forms. The first is oil floating on the surface of the water, the second is oil in emulsified form under the surface of the water, and the third is dissolved oil compounds in the water.

These forms are lethal to everything that comes into contact with them in the Gulf according to Dr. Ahmad Mursi. Oil floating on the water surface deprives oxygen to fish and marine life, compelling fish to migrate from the area contaminated with oil to another clean area. Fish near the surface of the water do not escape undamaged, because the oil adheres to them, impeding their movement and leading to their death or acquisition of an unacceptable taste and odor. This oil also kills and destroys coral reefs, making them unable to regenerate for hundreds of years. These coral reefs represent an important resource of the countries located on seas in general, because they are a life form that is integrated and balanced with fish and marine organisms. In addition, floating oil accumulates in large quantities on coasts used for recreation. As for oil that is emulsified under the water surface, such oil reaches a depth of more than 15 meters. It directly affects fish and marine organisms and the environmental balance in the Gulf, because it adheres to the bodies of fish, including their eyes, gills, and fins, which causes them to perish completely within a very brief period.

### The Danger Posed to Fish

As for the third form, it is considered the most dangerous form of oil that has been discharged into the Gulf, because it is difficult to deal with it and to determine its location, because it is dissolved into the water of the Gulf. It affects fish and marine life in the Gulf directly and indirectly in both the short- and long-term. The direct effect is through the concentration of these toxic, dissolved compounds in the bodies of fish. An increase in such concentrations poisons the fish and directly causes them to die. The long-term effect is through the concentration of oil compounds in the bodies of fish in percentages that the fish can tolerate. Consequently these toxins reach human beings through the exploitation of the fish as food. It should be indicated that the countries on the Gulf depend entirely on fish as a main food source. In addition to the effect on marine life of the millions of tons of oil that have been discharged into the Gulf, there is another no less dangerous effect, according to Dr. Ahmad Sayyid Mursi, which is the possibility that the oil will affect drinking water in the Gulf countries, which obtain 90 percent of their water needs from the Gulf following desalinization operations. Given this disaster and the large amounts of oil, it is certain that this oil is reaching the intakes of desalinization plants. This affects the desalinization plants directly, because, if oil enters the plants during desalinization operations, which depend on the vaporization and subsequent recondensation of water from the Gulf, the dangerous oil compounds increase when they are

vaporized. This vapor is then recondensed into water that contains several dangerous compounds, such as benzene and phenols, and several dangerous organic compounds that are difficult to remove by ordinary methods. These compounds give the water an unacceptable taste and odor and are extremely dangerous. Their presence in desalinated water used for drinking purposes leads to affliction with dangerous diseases, the foremost being cancer. Another danger is posed by the combination of these compounds with chlorine: It is well-known that all of the desalinization plants use chlorine to sterilize the water and to kill germs and microbes before and after desalinization. If chlorine is used, new halogenous or chlorinated [maklurah] compounds are formed, which are dangerous to health and more toxic than the oil compounds themselves.

Dr. Mursi draws attention to the need to use ozone instead of chlorine to sterilize the water under the current circumstances to avoid the formation of new compounds. It is also necessary to make use of active carbon filters to remove such compounds from drinking water after treatment and before the treated water is pumped into the distribution network in order to safeguard the health of citizens.

#### [Oil Spill]-Countering Companies Under the Microscope

The methods for countering [oil spills] used by companies and organizations specialized in this field to eliminate oil floating on the water's surface include mechanical, chemical, and biological means. Mechanical means entail the use of barriers to prevent the spread of oil on the surface of the water and the use of equipment to vacuum the oil and deposit it in specially designed tanks. There are natural materials that can absorb oil, such as rice straw and sawdust, which are sprayed over the oil and recollected by special equipment. Industrial materials are also used to absorb oil, such as synthetic fabric that is characterized by a high ability to absorb oil. Such material is spread over the oil, recollected, rung out, and spread again. The oil that reaches the coast is collected by other equipment. There are other mechanical methods involving the use of highly dense material that is sprayed on the oil, which increases its density and causes it to sink to the bottom. This method affects marine life. The final mechanical method is to burn the oil, which is prohibited in areas near residential buildings and industrial installations, because it produces black smoke and toxic gasses that pollute the air, as the burning wells are doing.

The chemical method entails the use of chemicals that are spread over the oil slick to transform it into minute particles that disburse underwater. The Egyptian scientist cautions strongly about the need to test these chemical materials before using them to determine their suitability and make sure that they are not toxic or damaging to marine life in general, because some dispersed material is much more toxic than oil itself and

enters into drinking water. Therefore, the Gulf countries must become aware of beneficial, precise treatment methods.

The biological method relies primarily on small living organisms located in the marine environment that feed on the oil material, which leads to the breakup and dissolution of the oil in the marine environment. However, these organisms would require long periods of time to eliminate the existing oil.

Dr. Ahmad Mursi adds that the treatment of such a condition will require more than ten years, in view of the absence of immediate treatment following the discharge of the oil into the Gulf, because of the war conditions. He calls for the application of measures to desalinization operations to protect drinking water intakes, in addition to the use of modern methods to treat the water after desalinization to rid it of oil compounds, because oil material will affect desalinization equipment and systems directly. Also, contaminated water will affect the equipment of electricity generating plants, and could perhaps cause fires in them.

#### The Disruption of Environmental Systems

Ambassador Na'im Qaddah, the representative of the UN Environment Program for the Arab League, states that the pollution in the Gulf became more challenging after the first Gulf war between Iraq and Iran and subsequently the most recent war. The problem in the Gulf is that the water in it is not renewed quickly and requires 100 years to be renewed. A large amount of industrial waste and chemicals thus persists in the Gulf, which is a source of fish resources and water for desalinization to supply drinking water to the populations of the countries located on the Gulf. He indicates that the area of the oil slick in the Gulf has diminished and that the program will take measures to limit the environmental damage caused by the Gulf war. Experts have estimated that the length of the slick is about 120 km and its width fluctuates between five and 25 km along the Saudi coast. Wooden barriers have been used to protect the intakes of water desalinization plants. However, these barriers are not effective in protecting coastal environmental systems pertaining to marine plant life and fish spawning grounds.

In view of the severity of the danger posed to water in the Gulf, Dr. Mustafa Kamal Talabeh, the executive director of the United Nations Environment Program, has decided to undertake a long-term project to protect the marine environment in the Gulf region in cooperation with the Regional Organization for the Protection of the Marine Environment in the Gulf after it is cleared of mines and different weapons.

Regarding the catastrophe caused by the discharge of oil into the Gulf, Dr. Bahrami Mahmud, the director of the Oil Research Institute, emphasizes that this catastrophe is unprecedented, and that if it is not contained and treated by means of a systematic, sound method, it will have a terrible effect on the environment, inasmuch as it

will spread continually in different directions and will occupy large areas, to the point where the thickness of the oil layer will, in some parts will reach 1 million cm, compared to a thickness on the first day of 3 cm. Therefore, it is possible that very large parts of the Arab Gulf will be polluted completely, and that the effects of this pollution will extend to the Indian Ocean.

#### Widespread Danger

According to Dr. Bahrami, the most serious danger is the ascent into the air of large amounts of gases that accompany oil, such as propane [brotan] and butane. Some light oil derivatives evaporate into the air, becoming gaseous clouds and subsequently combustible benzene clouds, because the discharge of the oil occurred in the winter. We assume that gasses constitute 50 percent of the oil that Iraq discharged into the Gulf. That means the possible formation of a cloud containing more than 25,000 tons of gasses and light, vaporized oil material subject to combustion and explosion if exposed to a burning object.

He believes that this oil could destroy the entire marine environment, through the poisoning or asphyxiation of the main animals in the Gulf, fish, crustaceans, and pearls. In addition, it could dangerously disrupt the environmental balance between different forms of marine life, create an opportunity for the growth of one type of life at the expense of another, and destroy the food chain in the water. The marine environment is expected to return to its former state only after more than 50 years.

He indicates that desalinization plants are in danger, because they are designed to remove salt, dirt, suspended material, and other pollutants in the water of the Gulf under normal circumstances, but are not equipped to treat very high levels of oil pollution. Consequently, the filters of these plants will be affected, and their ability to purify the water will be reduced significantly.

#### The Exit of Oil Is Double the Speed of Sound

The explosion and burning of 600 oil wells in Kuwait is considered the flip side of the drowning of the Gulf in oil. Dr. Mahmud Rabbah, a professor and expert in industrial and oil waste at the Metals Research Center, who has long been active in Saudi Arabia and has conducted experiments on oil fires and methods to extinguish them, states that, now, after Kuwait has become liberated, the feelings of happiness have become mixed with the deep wounds left behind by the occupation in most utilities of the country. If oil wells are set on fire or exploded, their contents gush out. Most of the eastern wells in Kuwait contain about 45-percent combustible gasses and 55-percent liquid oil. These compounds burst out under high pressure at speeds in the well of up to about 7 meters per second, which is supersonic. The volume that is discharged from a well, according to the diameter of the pipe, is estimated at about 250 tons per hour or 2,000 tons per day in the case

of a small well with an estimated production capacity of 20,000 barrels per day alone, which, when multiplied by 600, the number of wells set on fire, boggles the mind.

He adds that the byproducts of oil combustion consist of highly toxic chemical compounds that pollute the surrounding environment. These byproducts include the fine carbon particles that form dangerous black clouds that constitute 30 percent of the weight of the burning quantities, and the rest consists of poisonous carbon oxide, sulfuric acid oxides [?], and annular [halaqi] organic paraffin [barafiniyah] compounds with varying degrees of chemical breakdown under the effect of the heat generated by the fires. The byproducts of the fires disperse to altitudes of more than 3 km in the atmosphere and are shaped like an inverted triangle of black smoke whose apex is at the well outlet. These products are carried by the wind to distant areas where they fall by the force of gravity as a result of a slowing of the speed of the wind bearing them. They fall in the form of a "black mist" of smoke that coats everything on the ground with a black color. These byproducts are considered to be extremely carcinogenic to the skin and the respiratory system according to Dr. Muhammad Nada, a professor of skin diseases at Qasr al-'Ayni, in addition to other environmental factors.

The fires at the small wells generate enormous heat radiation within a diameter of no less than 500 meters, and the sound of the flames is a frightening phenomenon, making any approach toward these wells hazardous. The burning oil wells not only adversely affect their immediate area in Kuwait, but also the Iraqis themselves, because the wind carries the pollution they cause into Iraq.

Dr. Rabbah states that the process of extinguishing the oil fires requires initial information that is needed to design the method and means to extinguish the fires. This process depends scientifically on the weight of the material exiting from the well outlet, the pressure under which it is exiting, its gas and liquid content, the design and form of the well itself, the conditions of the ground surrounding the well, the wind direction and speed, the air temperature, the humidity, the proximity of other wells, and the combustion temperature of the oil material, which usually fluctuates between 1,100 and 1,600 degrees Celsius.

Scientific and practical studies indicate that the extinguishing process is complex and extremely dangerous, because the well is subject to spontaneous combustion after it has been extinguished, or exiting oil material comes in contact with other oil material due to the wind, which necessitates the simultaneous extinguishment of the relevant wells. Also, the chemical and physical composition of the oil gushing out of the wells changes in an uncontrolled manner, which affects the geological features of the well. Such changes can also be accompanied by the collapse of underground structures in the areas surrounding the well. Therefore, the fire extinguishing

technology to be used depends on the formation of a number of teams whose goal is to achieve all or any of the following:

- The rapid, continuous cooling of the exiting gasses to a height of no less than 16 meters.
- The removal of the oxygen in the air so that it does not come in contact with the exiting oil material.
- The closure of the well outlet mechanically by means of installations that can tolerate enormous upward pressures caused by the oil.

### The Fire Is Higher Than a Mountain

Before conceptualizing the method used to extinguish burning wells, we should indicate that these enormous fires effect both humanity and the environment [bunyah; read: bi'ah]. Actuarial measurements were taken of a flame bursting forth, in an internationally recorded incident, from a well with a diameter of six inches. The following emerged from the measurements: The well [normally] produced daily 8,200 b/d, and it contained oil material comprising, in terms of weight, 34-percent liquid, and the rest gasses, some of them combustible. The fire generated a flame in the form of an inverted cone, with an apex at the well outlet and a base in the sky. The height of this triangle totalled 1,450 meters, the height of a mountain. The base was in the form of a circle whose area totalled about 16 km. The combustion process included the heat breakdown of organic compounds of the oil, producing other materials simpler in structure, such as carbon and other gasses, such as carbon dioxide, sulfur dioxide, and sulfur monoxide. These gasses have an extremely acidifying pollution effect on the environment in the form of destructive acid rains.

Dr. Mahmud Rabbah adds that, based on a study of the conditions in the area of the wells in Kuwait, it is preferable to divide the wells into three divisions based on type: The first includes wells that are near each other, the second wells that are relatively far from each other, which are subdivided according to diameter, and the third type includes small, nonburning wells that have nonetheless been destroyed and will not be reactivated until after the surrounding fires have first been extinguished. Factors which facilitate the speed of combustion include the nature of the climate in Kuwait, which is characterized by high temperatures in the summer, which is imminent, and a high degree of humidity. Given these factors, it is probable that the extinguishment process will last for three months, once it begins, for about 40 percent [of the burning wells]. There are 220 wells [that will be extinguished during this period] and they will be extinguished through the isolation and separation of the oil material supporting the flame by covering it with enormous quantities of soil or a dome of asbestos material or steel flakes.

### 0.5 Million Tons Burning Daily

During the first year, Dr. Rabbah expects that another 20 percent of the burning wells will be extinguished, i.e.,

about 120 wells, by spreading and releasing foam material and liquids to surround the flame, isolate it from the air, and prevent it from mixing with the air, leading to the chemical disturbance of the conditions of combustion. During the remaining two years, wells having a concentrated gas content or large outlets will be dealt with. Fortunately, an examination of the oil well sites in Kuwait indicates that they are spread over a large area, with a distribution of 22 wells per sq km. Most of these wells are concentrated in the northern, western, and southern areas of Kuwait, which facilitates dividing, classifying, and dealing with them. However, the fact remains that, until they are extinguished, about 0.5 million tons of oil will burn daily, which is more than the amount that Kuwait produced before the war. These fires are producing a renewable cloud of black smoke containing carbon and sulfuric and carbon oxides that are dispersing in the air over an area of 120 km. The cloud is carried by the wind to the east, west, north, and south, to fall in areas as far away as the southern Soviet Union hundreds of kilometers away. Or the cloud moves eastward to cover areas of Western India passing through Iran and the surrounding area, or it floats above the Indian Ocean, which increases the destructive effect on the environment, not only regarding the air, but also the land and the sea, destroying the civilization of mankind. All of this has happened because of a person who lost his vision and insight.

Dr. Mahmud Nasrallah, a professor, and the chief of the air laboratory at the National Research Center, states that the outbreak of fires in such a large number of wells will certainly affect the climatic balance on earth. The sudden increase in the pollution caused by the discharge of large quantities of pollutants produces a greenhouse effect on earth by increasing gasses in the atmosphere, especially carbon dioxide. These climatic changes could ultimately lead to a slight temperature increase. If the temperature of the earth has risen by an average of one-half degree during the past 50 years, the bombing of the oil wells in Kuwait will lead to an increase in the global temperature of about 0.1 to 0.2 degrees Celsius.

Finally, an Egyptian scientist, Dr. Jamal al-Fandi, a professor of astronomy at Cairo University, spoke, saying that the atmosphere is the "roof of the earth," extending to a height of only 1,000 km. It is composed of layers, one on top of the other. Each layer has a specific characteristic and function. The sun's light and heat radiation penetrate all of the layers fully to reach the earth's surface. The bottom or surface layer, which is only about 20 kilometers above our heads in the hot tropical regions, ends with a natural heat distribution that prevents the upward penetration of air pollutants or water vapors. It is called the "heat inversion" layer. Thus, all pollutants are concentrated only in the bottom layer. Clouds are also located in this bottom layer, and they produce rain that gradually washes the pollutants out of the atmosphere. However, when enormous quantities of oil burn as the result of the explosion of wells, as happened in Kuwait, the result is the dispersion of



carbon dioxide and carbon particles in only the bottom layer and there is no opportunity for the rain to wash them out, except over the course of many years. It is expected that these clouds will be distributed over the surface of almost the entire world, due to the general circulation of winds, including the general air currents that flow over the earth, such as the northwestern wind that blows over tropical areas such as the Arabian Peninsula, Egypt, and North Africa.

He adds that the explosion and burning of the wells on such a major scale within such a limited area will be accompanied by intense warming that will, in turn, lead to destructive "quasi-cyclones" that move in accordance with the general circulation of the wind. Such a cyclone could move from east to west, passing through Saudi Arabia, Jordan, and Egypt, and to the southwest, passing through Saudi Arabia, Yemen, Sudan, and Ethiopia, perhaps affecting the Nile inundation rains. The climatic fluctuations occurring at present in Egypt are the result of the Iraqi forces' burning of Kuwaiti oil. The extent of the effect of these high winds on the inundation requires an exhaustive study, so that the effect can be predicted accurately.

#### The Loss of Several Seasons

It is certain, according to Dr. Jamal al-Fandi, that the spread of these clouds will produce a complete change in the distribution of air pressure. Hence, the seasons of the year will change noticeably. Some seasons could be eliminated or the air could become winterized for a number of years. Other results could be a large reduction in solar energy that reaches the earth and the spread of epidemics in the plant and animal worlds due to a change in rainfall distribution.

He emphasizes that these massive changes that are now occurring could lead to an atmospheric catastrophe that would produce major changes throughout the world, not just in the Gulf. The different effects of these clouds will not in any case affect the ozone layer, because the heat inversion layer prevents them from reaching the ozone, which has been proven not to play any role in atmospheric activity. Before these changes begin to occur, they will be preceded by such indications as the occurrence of a cyclone during combustion, its movement with the general circulation of wind, a reduction of solar radiation, and a paucity of oxygen in the air.

### EGYPT

#### Officials, Scholars View Nile Water Wastage

91WN0394A Cairo AL-AKHBAR in Arabic

[Report by Jamal al-Sharqawi]

[29 Mar 91 p 3]

[Excerpt] We pray for rain, lest the crops die, the animals perish, and people starve on our northern coasts.

Nonetheless, we allow billions of cubic meters of water that has gathered and is flowing in the Nile to be lost in the sea, with complete volition!

While experts are striving to research water sources, including the enormously costly desalinization of sea water, to offset the shortage that we will face, we insist on transforming our fresh water into salt water before desalinizing it shortly thereafter!

Strangely, we are aware of the facts. We have programs to store this water and use it to expand our agricultural land, supply industrial water requirements, and supply drinking water for the growing population. However, we prefer to waste time, so that abundant fresh water continues to be wasted in the expanding salty sea, which needs no more fresh water!

The first and largest of these projects involves using the northern lakes [Lake Manzalah and Lake Burullus] for the storage of winter obstruction water [water that flows in the main channel of the Nile from 5 January to February 10 into the sea, because the Public Works and Water Resources Ministry closes the gates to most of the medium-sized and large irrigation canals, given the low water requirements of plants during this period].

This project has been under consideration for 25 years. Studies began in 1966, but were suspended by the 1967 aggression. Attention was refocussed on the project in 1985, against the background of the advancing drought in Africa, consecutive low Nile inundations, and increasing concern over the invasion of the desert. At that time, the Irrigation Ministry prepared a draft water policy or strategy to control consumption and to manage water resources to meet the needs of development plans through to 1990, and then 2000.

In 1980, the Irrigation Ministry estimated our water resources until 1990, based on what was available in 1980, at 60.7 billion cubic meters [cu m] (55.5 billion cu m from Egypt's share at Aswan, 2.9 billion cu m from the underground reservoir in the delta and Upper Egypt, and 2.3 billion cu m from the reuse of land drainage canal water). The ministry also added 2 billion cu m, which is the additional share at Aswan due to the implementation of the first stage of the Jonglei Canal Project [in southern Sudan] as of 1985, 2 billion cu m from the underground reservoir, and 7.7 billion cu m from the reuse of land drainage canal water. With these additions, water resources until 2000 totalled 72.4 billion cu m.

This compares with uses in 1990 totalling about 61.6 billion cu m, which will increase by 2000 to 64.5 billion cu m, which makes available 7.9 billion for purposes of horizontal expansion, considering that new land reclamation at that time will be on the order of 1,580,000 feddans.

#### Shortage of Resources

However, the actualization of these estimates encountered two obstacles:



1. The fact that the Jonglei Canal Project was not implemented, due to military operations in southern Sudan, which subtracts 2 billion cu m from the estimates.

2. The pollution of land drainage canal water, which reduces the estimate by about 4 billion cu m.

Given this water resource deficit (which can be remedied only by retarding land reclamation projects!), the Irrigation Ministry reviewed its policy and formulated a new strategy to offset the shortage.

The Irrigation Ministry decided to expedite the implementation of a national plan to develop irrigation by controlling consumption and regulating the Nile, along with the expanded use of underground and drainage canal water for irrigation and drinking purposes.

The ministry searched its books and found studies pertaining to the storage of winter obstruction water in the northern lakes.

At the time, it found itself facing a strange situation: It was implementing development projects and drawing on its underground reservoir, both at enormous costs, while a large amount of high quality water was flowing unused, and could be stored, protected, and used for a small outlay!

Thus, the use of water from the winter obstruction/minimum need period was added to the water strategy.

#### A Strategy and Four Committees

The new strategy was presented to the Supreme Policy Committee, which approved it in principle and decided to form a technical committee composed of pertinent ministers to study the details. The committee convened under the chairmanship of Engineer 'Isam Radi, the irrigation minister, and subsequently, under the chairmanship of Engineer Isma'il Badawi, then deputy minister.

Then, Dr. Yusuf Wali formed another committee to study only the project involving water storage in the northern lakes under the chairmanship of Dr. Raja' 'Abd-al-Rasul, the former director of the National Planning Institute. A third committee was formed under the chairmanship of Dr. Mustafa al-Jabali, the former agriculture minister, and a fourth under the chairmanship of Dr. Abu-al-Fattuh 'Abd-al-Latif, the former chairman of the academy.

A large number of experts from all specialties participated in the proceedings of these committees and the presentation of papers regarding the subject. They included:

From the Irrigation Ministry: Dr. Mahmud Abuzayd, chief, Water Research Center; Dr. 'Abd-al-Hadi Radi, director, Water Research and Distribution Institute; Dr.

Kamal Hafni, director, Ground Water Research Institute; and ministerial deputies Tharwat Fahmi, Muhammad Amin Muhammadayn, and Hilmi Mahmud.

From the Agriculture Ministry: Dr. Yahya Husayn, chief, Fish Resource Authority; Engineer Tahir Yusuf, director of operations in the organization at the time; Dr. Ibrahim 'Antar, chief, Land Improvement Agency; Dr. 'Abd-al-Rahim Shahhatah, the former head of the Agricultural Research Center; and Dr. Hasan Khadr, then director of the Minister's Technical Office.

From the Construction Ministry: Engineer 'Abd-al-Hamid al-Tawdi, chief, Central Construction Agency; and Engineer Isma'il Badawi, chief, Agricultural Construction and Projects Authority.

Other members of committees included Dr. al-Muhammadi 'Id, chief, Environmental Affairs Agency in the cabinet; Ra'fat Yusuf Abu-Sayf, Irrigation Division director, Planning Ministry; Ambassador Ahmad Fu'ad Husni, director of Sudan affairs in the Foreign Ministry; Engineer Muhammad Taha al-Safta, first deputy electricity minister; Engineer Mahmud Sami, deputy minister for Technical Bureau Affairs; Dr. 'Imad al-Sharqawi, deputy head, Egypt Electricity Authority; Staff Major General Mustafa Jawdat al-'Abbasi, deputy chief, Armed Forces Operations Authority; Dr. Ahmad al-Rifa'i Bayyumi, director, Lakes and Fisheries Sciences Institute; Engineer 'Abd-al-Maqsud Ahmad Sadiq, chief, General Riverine Transportation Authority; and other experts whose assistance was sought.

A comprehensive examination of the proceedings, minutes, reports, and final recommendations of all of these committees, which convened over the course of about a year, yields the following:

- The experts agreed with the Irrigation Ministry on the need to give top priority to water conservation as a national duty in examining any water policy.
- Many of the experts displayed reservations (especially agricultural experts and fish resource officials) regarding the project. Many noted the need to study the side effects of the project carefully. All agreed that any large national project necessarily has side effects, which do not cancel out the project's importance, but should nonetheless be studied along with alternatives by those implementing the project.
- All experts were given pause by the grave fact that 4 billion cu m of fresh water were being lost in the sea (it was 6 billion before that, but had then declined to less than 4 billion due to control measures and the development of irrigation systems).

#### The Story of the Winter Obstruction

Before we review and evaluate the views that were presented during the meetings of 1985-1986, based on interviews which I conducted recently with all of the main relevant parties to ascertain their current views

five years after the committees finished their proceedings, let us ask: What is the project to store winter obstruction water in the northern lakes?

But before we answer that, what is the winter obstruction?

During the cold period of the year (from late October until early March), plants need very little water, because the air is moist and the soil retains moisture. Therefore, the Public Works and Water Resources Ministry allows only a minimum outflow from the High Dam, inasmuch as no increase in the water flow is needed, and moreover an increase would cause more damage than good.

Thus, the water level in the Nile and the medium-sized and large irrigation canals is at its lowest level during this period, in accordance with needs.

However, within this period is the coldest period of the winter (December and January), when plants need no water. Therefore, since the introduction of modern irrigation systems to Egypt, especially since the construction of the High Dam, the Public Works Ministry and Water Resources permits a quantity of water to flow in the main channel of the river, but closes the gates of the medium-sized and large irrigation canals completely, preventing water from entering them, so that they become dry. The only exceptions are the medium-sized canals that supply our cities with drinking water.

The winter obstruction begins (as is the case this year) on 5 January in Upper Egypt and continues for three weeks, then on 12 January to continue for three weeks, and then on 19 January in Lower Egypt to continue for three weeks. [as published] In other words, it lasts for 35 days, from 5 January until 10 February.

The winter obstruction has three advantages:

- The soil and the plants need no water. Moreover, water damages the soil and plants during this period with the exception of new, sandy [reclaimed] areas.
- It is an opportunity to cleanse the soil with a general irrigation, which precedes the winter obstruction. Then the soil is rid of ground water. This process improves the soil and maintains its fertility until the next general irrigation is carried out, thus benefitting agriculture.
- The third benefit is that the winter obstruction period provides an opportunity for the Public Works and Water Resources Ministry to clean the medium-sized irrigation canals, perform maintenance on the industrial works in them, and build foundations for new water installations.

Many discussions have thus revolved around whether or not we should retain or eliminate the winter obstruction. Besides the said benefits, other considerations also enter the picture.

### The River Serves More Than Just Agriculture

The major problem faced by Egyptian officials is the incompatibility between the water needs of the land and plants on the one hand, and the water needs of other parties and elements on the other. The land and agriculture can dispense with water altogether or greatly during the winter obstruction period when their water needs are few. However, other parties and elements require much larger amounts of water.

Officials of the Public Works and Water Resources Ministry have no recourse but to meet these demands by releasing water—water that does not benefit agriculture.

This water flows through the river to the Rashid and Damietta branches and then into the sea.

How much water flows into the sea?

Before the High Dam was built, the amount that flowed into the sea totalled 32 billion cu m. After the High Dam was built, it totalled about 6 billion. However, the Irrigation Ministry's accounting report on the average during 1975-1985 shows the following amounts that flowed into the sea during this period: October, 120 million cu m; November, 220 million cu m; December, 960 million cu m; January, 2,050 million cu m; and February 824 million cu m, for an annual average of 4,134 million cu m!

According to the minister's statement, the Irrigation Ministry was able to drastically reduce the amount of water lost to the sea in 1985-86 to 102 million cu m in October, 166 million cu m in November, 625 million cu m in December, 1,350 million cu m in January, and 659 cu m in February, for a total loss of 2,902 million cu m, i.e., about 3 billion instead of 4 billion cu m.

In a recent interview with Eng. 'Isam Radi, the minister of Public Works and Water Resources, he told me: We have made efforts to reduce the amount of wasted water to the lowest possible minimum. This year, the amount of lost water will not exceed 1.8 billion cu m.

However, this does not mean that the problem is over, because 1.8 billion cu m can irrigate at least 500 million feddans, i.e., about five times the total projected reclamation area in all of Egypt!

[1 Apr 91 p 3]

[Excerpt] The Irrigation Ministry's plan to use winter obstruction water assumes the storage of 2.3 billion cu m of water that would otherwise flow into the sea, including 1 billion in Lake Manzalah and 1.3 billion in Lake Burullus. The two lakes were chosen because they are our largest northern lakes and the most capable of absorbing these large quantities.

The following is a summary of the project. It is based on: a presentation by Engineer Hilmi Mahmud, the deputy irrigation minister for projects affairs in 1985; explanations given to me recently by Dr. Mahmud Abuzayd, the

head of the Water Research Center, and Dr. 'Abd-al-Hadi Radi, the director of the Water Research and Distribution Institute; and on-site visits with local officials responsible for projects and fish resources at the two lakes.

- The feeding of the two lakes with fresh water during the winter obstruction (December, January, and February), after they are emptied of salt water.
- The drawing of fresh water from these lakes for irrigation purposes during months when this water is needed.
- The emptying of the two lakes in November to prepare them to receive new water at the beginning of the winter obstruction.

In all cases, a water level of 0.5 meters [m] of fresh water will be maintained in each lake, as dead (unused) capacity, which is tantamount to fresh water pressure to prevent the infiltration of salt from sea water.

#### **The Lake Manzalah Project (Was):**

The lake is to be fed by fresh winter obstruction water from the Damietta Branch through the al-Salam medium-sized irrigation canal facing the new Damietta aqueducts [qanatir]. This water will then be redrawn to feed the al-Salam medium-sized irrigation canal with a part of the water slowly (i.e., without raising) in front of raising station no. 1.

After technical studies, it was concluded that the storage level in the lake should be 1.5 m, which is the level that is permitted by the levels of the Damietta Branch and the Damietta Dam.

In order to achieve that, it was estimated that 1 billion cu m would enter the lake from the Damietta Branch and 800 million cu m of water would enter it from land drainage canals, for a total of 1.8 billion cu m.

Evaporation and other losses for any reasons reduce this amount to 1 billion cu m, leaving a net 800 million cu m that can be drawn for irrigation purposes.

It should be noted that the project assumed that fresh water would fill only two thirds of the lake, and that the remaining third adjacent to the sea would be left as is.

The salinity in the lake was monitored monthly throughout the year. The average content of salt (from different sources) fluctuated between 1,150 and 480 parts per million, which is within the salinity limits permitted for irrigation.

The Irrigation Ministry estimated that the industrial works needed for the Lake Manzalah part of the project would entail an initial cost of 70 million Egyptian pounds.

#### **Regarding Lake Burullus**

Fresh water would enter the lake through a canal from the Rashid Branch facing the Idfina aqueducts [qanatir].

A portion of that water would be redrawn by raising it again to the Rashid Branch to irrigate areas neighboring the lake in the northern delta.

The study settled on a 2.5-m storage level in the lake and the following water balance:

1.3 billion cu m would enter the lake from the Rashid Branch, 900 million cu m would enter from land drainage canals, and 700 million cu m would be lost to evaporation and other losses, leaving a usable net of 1.5 billion cu m for irrigation.

Salinity was monitored over the course of the year and found to average between 11,000 and 470 parts per million, which is within the limits permitted for irrigation.

The industrial works needed for the Lake Burullus project include:

- The construction of an outlet aqueduct [qantarat ma'khadh] facing the Idfina aqueducts.
- A feeder canal that would carry the outflow during the winter obstruction from in front of the Idfina aqueducts [qanatir] to the lake over a length of about 15 km (this canal has a base in Barinal nilometer [manyal], which would be expanded and prepared to carry the required amounts of water).
- A high bridge for the canal to intersect with the large right canal of the Rashid Branch.
- An aqueduct for the excess water flow from the lake to the sea [and for the passage of fish as indicated by the photograph caption] (at the Strait of Burullus).
- Industrial works for the irrigation outlets (eight outlets to irrigate the areas neighboring the lake).
- A pump station to re-elevate the water into the Rashid Branch to irrigate lands in the northern delta, with the necessary side canal.
- Three pumping stations to raise no. 7 and no. 11 land drainage canals, so that they open into the lake.
- A 4-m high and 20-m wide protective embankment around the lake.
- A 67-km long, 500-m wide drainage canal passing around the lake for the passage of drainage canal water that would [otherwise] flow into the sea.

The costs of these works and expropriation totaled an estimated 120 million Egyptian pounds (1985).

#### **The Irrigation of a 0.5 Million Feddans**

The Irrigation Ministry stated that its project would provide enough water for the following:

- Regarding Lake Manzalah, the reclamation of about 115,000 feddans by means of water taken from the lake via the al-Salam medium-sized irrigation canal.
- Regarding Lake Burullus, the reclamation of 50,000 new feddans and the irrigation of 163,000 feddans of existing agricultural land using the water of the lake.

A broad, serious debate has gone on between experts regarding the project, especially between irrigation

experts and agriculture experts. Ultimately, the debate produced a positive outcome—a second project was added to the lakes project.

Based on the 1985 figures, the lakes would be able to absorb only 2.3 billion cu m of the 4 billion cu m of water available from the winter obstruction/minimum need period. Hence, Dr. 'Abd-al-Rahim Shahhatah, the head of the Agricultural Research Center (the current governor of al-Fayyum), submitted a memorandum containing the Agriculture Ministry's opinion and a request to study the use of a portion of the balance of the winter obstruction water to irrigate a winter crop on the northern coast via the al-Nasr medium-sized irrigation canal. The author of this article is enthusiastic about this project, because it can achieve the expansion of organized wheat cultivation on the northwestern coast.

Irrigation experts agreed with this direction. All of the committees that had been examining water policy also approved of it, stating that this latter project would not be an alternative to the lakes program (because it would absorb only a small portion of the water of the winter obstruction), but would complement it.

The Public Works and Water Resources Ministry drafted a full study on this project, pursuant to which the al-Nasr medium-sized irrigation canal was extended to the area of al-Dab'ah and al-'Alamayn to provide about 2.73 million cu m daily from 1 December to late March each year to irrigate about 200,000 feddans in the governorate of Matruh to supplement rainfall for the cultivation of wheat and barley.

Public Works Minister Eng. 'Isam Radi told me when I last interviewed him that the ministry has based its calculations on the allocation of 300 million cu m of water of the winter obstruction for this project, despite the decrease in the general amount of this water.

### The Electricity Situation Has Changed

The water that flows in the Nile and its branches and canals serves not only irrigation and agriculture, but also other agencies, whose existence depends on Nile river water, the foremost being the Electricity Ministry.

The turbines of the High Dam, the Aswan Station, and the Aswan 1 Station produce hydroelectric energy. This energy cannot be generated if a specific amount of water is not drawn off. In 1985, this amount fluctuated between 90 million cu m and 140 million cu m per day, whereas the needs of agriculture and consumption in the obstruction/minimum need period do not exceed 60 million cu m. At that time, these stations were producing about a third of Egypt's electricity.

There were long discussions then about the possibility of reducing our electricity consumption and thus reduce the allocation of water for the generation of electricity during the winter obstruction. However, representatives of the Electricity Ministry responded that this period

itself is a peak period of household [electricity] consumption, inasmuch as lighting alone demands about 30 percent of our energy.

The possibility of reducing industrial energy consumption was discussed. It was thought that the factories which consume the greatest amount of electricity (the Kima fertilizer plant and the aluminum complex at Naja' Hammadi were mentioned at the time) could perform their yearly maintenance work or cease operations, if only partially, in the winter season. However, this option was ruled out because of the circumstances of the industries themselves.

However, when it became known recently that the Public Works Ministry reduced the daily flow at the dam from 75 million cu m per last year to 70 million at present, I raised a question about the drop with Electricity Minister Mahir Abazah, who told me verbatim: I am no longer concerned by that. [I would not be concerned] even if the water flow was zero. I have a surplus of energy.

I asked him about the dam station and Aswan, particularly Aswan.

He said: Perhaps it is idle for several days, but that does not affect the overall situation.

He added: The problem actually pertains to riverine transport means, which transport fuel needed for one of our stations. This transport ceases if the level in the river drops more than that.

### Riverine Transportation: Necessary

As a matter of fact, I noted that Engineer 'Abd-al-Maqsud Ahmad Sadiq, the head of the General Riverine Transportation Authority at the time, was one of the greatest defenders of the need to maintain a certain level in the Nile and in the medium-sized irrigation canals—a level compatible with the needs of riverine transportation. At the time, he advocated a water flow from the High Dam during the winter obstruction of no less than 110 million cu m (this year it dropped to 70 million, which is the lowest level tolerated by riverine transportation).

When the idea of finding an alternative to riverine transportation was proposed, it was rejected completely (this idea would dispense with the electricity generated during the winter obstruction period by damming water that would otherwise be disbursed in this period for non-agricultural and non-household consumption, thus removing the problem of water flowing into the sea and eliminating the need for the storage projects at the lakes),

In a cost analysis of the project, which is contained in a report by Dr. Raja' 'Abd-al-Rasul, the head of the



technical committee, which treated the subject carefully and comprehensively, the following was noted:

- Riverine transportation transported 5 million tons of energy in 1985, and this amount is expected to reach 20 and perhaps 30 million tons in 2000.
- Riverine transportation has no alternative in various fields, such as: the transport of sugar from factories and molasses to Europe; riverine tourism; domestic passenger transportation on a seven-line riverine bus system; which was carrying 0.5 million passengers at the time; and 300 ferry boats.
- Riverine transportation carries some of the energy of some electricity generation stations, such as the Asyut station.

The study (according to 1985 prices) estimated the losses that would result from the absence of a water level that would permit a suitable draft for boats and barges in the river and its branches and irrigation canals as follows:

- 165 million Egyptian pounds, which is the difference between riverine transportation and land transportation.
- The construction of 1,000 km of new roads at an estimated cost of 200 million Egyptian pounds.
- The transport of sugar (it is difficult to estimate the losses in this regard).
- The transportation of molasses to Europe, \$2 million.
- Transportation in riverine busses and ferry boats (it is difficult to estimate the losses).
- Tourism, 66 million Egyptian pounds.

If these losses were estimated in current prices, they would exceed 1 billion Egyptian pounds. The loss of riverine transportation would also cause traffic tie-ups on the roads, the cost of which is difficult to calculate!

[passage omitted]

### Need To Store Nile Water in Northern Lakes

91WN0430A Cairo AL-AKHBAR in Arabic  
23 Apr 91 p 3

[Article by Jamal al-Sharqawi: "Nile Waters Lost to Sea; Deficit of Six Billion Cubic Meters in Water Resources; One Lake Is Enough"]

[Text] After the debates of experts in all specializations, after studies and counter studies, after hundreds of years in which Nile water has been lost and continues to be lost to the sea since Egypt developed an irrigation system, 30 years after the High Dam was built to retain any excess water for times when floods are meager—and how often have the flooding been meager in the 1980's—more than a quarter century after storage in the northern lakes was studied, and five years after the resolution by the Higher Policies Committee and the recommendations by four technical committees which labored for more than one year, what have we decided? Begin to implement the project whose detailed studies will require one full year and its construction three more years? What we mean is

that even if we begin with the project today, the water will continue to be lost for four more years!

Should the Nile waters continue to be lost for more years while we exchange accusations and nobody does anything and should we then allege that we are the most deep-rooted agricultural country in the world, that we have the immortal Nile, and that Egypt is rich with the greatest practical and scientific capabilities in agriculture and irrigation?

No matter what, I had to go to the minister of public works and water resources and ask him: What is the situation?

Engineer 'Isam Radi said: Since 1985-86, we have succeeded in reducing the quantities lost by the winter cycle to the sea from four billion cubic meters to 1.8 billion cubic meters. Now that electric power needs have diminished, we have reduced water releases from the dam to 70 million cubic meters daily, which is the volume needed for river navigation. We are still testing the possibilities of further reduction.

The minister added: Thus, we only need one lake to store 1.5 billion cubic meters, considering that 300 million cubic meters will be released to that al-Nasr Canal extension in this period to provide 200,000 feddans cultivated with wheat on the northwestern coast with supplementary irrigation, in addition to rainfall. This lake will be al-Burullus Lake.

I asked the minister: Will failure to store water in al-Manzilah Lake via the Damietta side canal affect the land within the purview of that al-Salam Canal, considering that there have been statements that the acreage will drop from 600,000 to 300,000 feddans?

He said: Absolutely not. An acreage of 200,000 feddans will be irrigated on the western side of the canal and of 400,000 feddans on the eastern side. We can increase the acreage on this side to 500,000 feddans.

I asked the minister about our current water position (beginning of 1991) now that a short period of time separates us from the end of the plan in 1991-92. He instructed Engineer 'Abd-al-Rahman Shalabi, the ministry undersecretary for affairs of the minister's technical office, to review the projects accomplished to date.

### Storage in North Is Essential

I then went and discussed with Dr. 'Abd-al-Hadi Radi, director of the Water Distribution Research Institute, the feasibility of a storage project if these quantities (4 billion cubic meters - 1.8 billion cubic meters = 2.2 billion cubic meters) have actually been saved and have become a reserve stored behind the High Dam.

Dr. 'Abd-al-Hadi reviewed the basic idea which makes the Ministry of Public Works release certain quantities of water into the river from the High Dam to the river mouth and that, consequently, makes preserving the water—if we want to preserve it and not to waste it in the sea—at the mouth an inevitable necessity to which there is no alternative.



He said: First, all along the river, along its two tributaries, and along the main canals from Aswan to Rashid, Damietta, and the canal cities (and all these are located in the northern valley) there are drinking and irrigation water plants. Their intakes are at certain levels. If the water drops below these levels, the plants cannot operate.

Second, there are losses that emanate from failure to use the water for any reason. Water just continues to flow to the river and into the sea.

Third, flood waters in Upper Egypt flow into the river and end up in the sea.

Fourth, heavy rainfall in wet seasons flows into the river and ends up in the sea.

Fifth, there is river navigation and transportation with all its importance.

Sixth, it is true that the Ministry of Electricity has enough resources to make up for the needs met by the Aswan-1 and Aswan-2 power plants. But if the water level drops, the two plants will be partially stopped, keeping in mind the difference in the economic costs between gas-powered plants and hydroelectric plants.

Seventh, preserving—and this is an extremely important element—the river itself, not to mention the man-made works built on it, such as barrages, bridges, and so forth.

Dr. 'Abd-al-Hadi Radi asked me: Can you or any Egyptian, or even any tourist for that matter, imagine looking at the Nile River and seeing a bare and desolate river bed with no water in it?

He added: All these considerations dictate that water not needed for agriculture flow into the river course from Aswan to Rashid and Damietta, not before these points. This is what makes it futile to consider any alternative for exploiting these waters anywhere but in the northernmost part of the country. These very same considerations are what has dictated that the storage be made in the northern lakes.

#### Winter Cycle Water in Damietta?

I debated with Dr. Mahmud Abu-Zayd, chairman of the Executive Council of the Aquatic Research Institute, those questions that the minister's words on storage in al-Burullus lake brought to mind.

#### Why al-Burullus and not al-Manzilah?

It is true that the al-Burullus fish production in general, and marine fish production in particular, is much less than al-Manzilah production. Consequently, al-Burullus fishermen's community is much smaller.

But in my mind, the issue continued to be one of principle or of the reasons for storage in the northern lakes. If the reasons noted by Dr. 'Abd-al-Hadi Radi, and they are truly compelling, are extant for the Rashid branch, then why aren't they so for the Damietta branch?

Or is it that after all this clamor about the need to store and exploit winter cycle water, the Ministry of Public Works will let a portion flow into the Damietta branch and then run to the sea?

In response to my concern over this option, Dr. Abu-Zayd said: The remaining part of the winter cycle which needs to be stored—1.5 billion cubic meters—is not a small quantity. It is enough to irrigate hundreds of thousands of feddans. We can no longer afford the luxury of wasting such an enormous volume. This is why the storage project has never lost its importance.

Second, the Rashid branch does actually receive at present two thirds the winter cycle water because it is the bigger branch and because it is the navigational route.

I protested: But beyond the Damietta Port, the Damietta branch also turns into a navigational route.

He said: This is true and this branch will get the water it needs to be navigable.

I responded: Then a part of the water will flow to the sea.

He answered: Al-Salam Canal receives water from the Damietta branch. We will divert the excess water to this canal.

I said: But the allotment and resources of al-Salam Canal are calculated in advance. Moreover, the canal consists of two stages. The second (east of the Suez Canal) still has several years...

Dr. Abu-Zayd responded: This, too, is true. We will increase the volume of water pumped into this canal to increase the arable land within its purview, as the minister has told you. But it cannot be denied that a part of the winter cycle water in the Damietta branch will continue to flow into the sea until the entire horizontal expansion project is implemented and until land reclamation relying on this water is completed.

#### Deficit... Anew

We now return to examine whether the project to store the winter cycle water has a fundamental or secondary place in our water position.

In 1985, the Ministry of Irrigation estimated that in 1991-92 (i.e. by the end of the second five-year plan) our water resources will amount to 69.8 billion cubic meters: 57.5 billion from Egypt's share in the Nile water (assuming that the first phase of the Jonglei Canal in Southern Sudan has been completed by then) plus four billion cubic meters from underground water plus 6.3 billion in drainage water plus 0.5 billion saved by developing the irrigation system plus 1.5 billion from partial exploitation of the winter cycle (assuming that the project is approved and implemented).

Where do these estimates stand now that we are at the beginning of 1991 and only a year or a little more than a year remains until the end of the plan?

The Jonglei Canal has not been implemented. So, this volume has decreased by two billion cubic meters.

**Underground water:** Data provided by Engineer 'Abd-al-Rahman Shalabi says that the current volume of underground water amounts to 2.6 billion cubic meters which will rise to 2.85 billion cubic meters by the end of the plan, i.e., with a shortfall of 1.15 billion cubic meters.

**Drainage water:** The same data says that the drainage water volume amounts currently to 4.6 billion cubic meters, with a shortfall of 1.7 billion (more water may be added to this volume by plan's end).

As for the storage project, it has not been implemented, nor even started. Consequently, all the water from this project, estimated at 1.5 billion cubic meters, is missing.

Thus, the total shortfall in resources amounts to 6.35 billion cubic meters.

Along with this resource estimate, the ministry estimated that ordinary uses will amount to 62.1 billion cubic meters, thus leaving 7.7 billion cubic meters for horizontal expansion.

It is assumed that there is a shortfall of 6.35 billion cubic meters in this volume, meaning that only 1.35 billion cubic meters are left for horizontal expansion.

It was estimated that the 7.7 billion cubic meters would irrigate 1.3 more feddans of land. So, by how much will the number of reclaimed feddans drop as a consequence of this enormous shortfall in water resources?

This is why exploiting every water resource and even adding new resources is something that deserves our utmost effort.

#### **Cheap Project**

What remains in this issue is the economic cost. How much will the al-Burullus Lake storage project cost?

In 1985-86, the estimate was nearly 120 million pounds. If we assume that this sum has now risen to 240 million or 250 million pounds, would it be too much?

The calculation will not be right unless we compare the cost of storing 1.5 billion cubic meters in the lake with the cost of securing this quantity from an alternative source.

Do we have an alternative source?

Our entire share of the Nile water, including the increment resulting from implementing the Jonglei Canal, is included in the plan, and so is the optimal volume of drainage water (7.1 billion cubic meters) and of underground water to the limit that permits safe use of the underground reservoir (4.9 billions). All this water is already slotted for use in certain areas until the year 2000. This is all and there is no other resource.

Therefore, we only have one of two options:

Either storage of the winter cycle water or sea water desalination.

How much will the desalination of 1.5 billion cubic meters cost us?

To date, a single cubic meter costs \$3. Thus, 1.5 billion cubic meters will cost us \$4.5 billion, i.e., nearly 12.5 billion pounds.

Isn't 250 million pounds a whole lot cheaper?

In conclusion, we tell the officials that time is passing and we want to march with it.

We do not want the desert invasion project to emerge from its current failure (lack of reclamation work) to be confronted with a greater failure when the land is ready but cannot find water.

We want to decide our supreme national affairs with the necessary firmness, with high responsibility, and far from personal or professional conflicts

We want to put the country's and the people's interest above all considerations so that the Nile water does not continue to be lost to the sea.

### **INDIA**

#### **Use of Leather-Treating Pentachlorophenol Banned**

*BK0706163091 Delhi All India Radio Network in English 1230 GMT 7 Jun 91*

[Text] The government has banned the chemical pentachlorophenol for treating leather and leather products. This is to prevent health hazards and damage to the environment. An official handout in New Delhi says the leather industry is requested to use two new chemicals, TCMTB and TCMO, to treat their export goods. The direction follows a ban by Germany on import of leather goods treated with pentachlorophenol. Germany is the single largest market for the export of Indian leather products.

### **ISRAEL**

#### **Minister Ne'eman Foresees Nuclear Power Plant Within 1 Year**

*TA1206091391 Jerusalem Qol Yisra'el in Hebrew 0400 GMT 12 Jun 91*

[Text] Energy and Infrastructure Minister Yuval Ne'eman says that the Israel Electric Corporation has accelerated the preparations for the erection of a nuclear power plant which, in his view, will be completed within a year [sentence as received]. This week, the corporation's director returned from a related visit to Hungary. He is scheduled to visit the Soviet Union and Finland in two weeks for the same purpose.

Yuval Ne'eman believes that the Israeli version of the reactor will consist of Israeli-made control and electronics systems, Soviet-made heavy equipment parts, and additional control and electronics systems manufactured in the United States and Germany.

### **Experimental Oil Shale Power Plant Proves Success**

TA1106104691 Jerusalem THE JERUSALEM POST in English 11 Jun 91 p 10

[ITIM report]

[Text] Tel Aviv—An experimental shale oil-fired power plant in the Negev has been operating successfully, boosting plans to build a 1,000-megawatt plant, Energy and Infrastructure Minister Yuval Ne'eman said yesterday.

As a result of the experimental program's success, there are plans to build eight to ten 120-megawatt units which would be connected to generate a combined 1,000 megawatts, Ne'eman said at a Bet Sokolov press conference. The plants would burn only shale oil, instead of coal.

The experimental power plant, completed in 1989 in the Negev's Mishor Rotem, produced 12 megawatts an hour, proving that large quantities of oil shale could be used for generating energy, general manager of Pama (Energy Resources Development) Avraham Kaiser said. Pama developed the plant and, after its experimental run, started selling electricity and steam produced there.

The Negev has one of the world's largest deposits of oil shale. Israel oil shale is the poorest in energy producing potential, having 700 kilo-calories per kilogram. The experimental plant proved it was nonetheless practical to use domestic oil shale for generating electricity, he said.

Israel has 12 billion tons of oil shale, which can generate as much power as 1.25 billion tons of coal, Ne'eman said.

## **MOROCCO**

### **King Calls for Conference To Share Water Expertise**

91WN0549B London AL-SHARQ AL-AWSAT in Arabic 15 May 91 pp 1, 4

[Text] Rabat—The Moroccan monarch, King Hasan II, called for the convocation of an international conference, with the participation of all countries of the South and the advanced North, to study medium- and long-range water problems and to formulate a technical and financial aid program for developing countries threatened by a water shortage.

The Moroccan monarch, in his speech to participants in the Seventh International Conference on Water Resources held in Rabat, also called for the establishment of a special international fund to finance programs to protect world water reserves from pollution, help

developing countries to mobilize their water, and to transfer information and techniques needed to develop the Third World Countries' self-reliance in building firm foundations in this area. King Hasan II, who was followed by his representative at the conference, Dr. Azzedine Laraki, the Moroccan prime minister, recommended the designation of a portion of the debts owed by developing countries to finance this fund.

He also called on the countries of the world to realize, now more than ever, that water is everyone's property, and that everyone must help each other and exchange expertise and technologies that ensure the regulation of natural systems and the complicated problems stemming from them.

The Moroccan monarch stated that if God has destined Morocco to be situated geographically in a semiarid zone, he has prepared Morocco for this by sowing the seeds of national solidarity. He stated that the government's order to establish formulas to ensure the transport of water from rain-rich areas to rain-poor areas takes into account current needs and the needs of future generations.

He declared his country's full willingness to share its experience with neighboring countries in the scope of international solidarity.

The Moroccan monarch reviewed the directions and philosophy pursued by Morocco based on its awareness of the effective role of water in generating economic and social development, from the construction of dozens of dams of different sizes and thousands of wells to irrigate millions of hectares and provide drinking water to residents, to the formulation of an ambitious program to research artificial rains with a view toward strengthening Morocco's water reserve.

### **Majority of Forests Threatened by Development**

91WN0459A Casablanca RISALAT AL-UMMAH in Arabic 7 Apr 91 p 6

[Text] Water erosion studies show that close to 54 percent of the areas planted with trees have become exposed to numerous dangers and certain loss.

This situation stems from the inappropriate use of agricultural, pasture, and forest lands.

Of the true forest areas, which are estimated to cover five million hectares, close to 31,000 hectares per year are subject to retrogression due to the uprooting of forest areas in response to growing demographic pressure to create new agricultural lands and to grazing that greatly exceeds the capacity of natural pasture lands, which precludes the natural replacement of forests.

According to the data, the forest sector contributes about 1.5 million fodder units per year to cover fodder needs.

It also emerges that the excessive exploitation of firewood by populations neighboring forested areas to cover their needs is more than three times greater than the productive capacity of those forested areas.

The decline of forested property currently exceeds all expectations, and natural pasture lands, which cover 7.5 million hectares in areas subject to erosion, are exposed to dreadful loss. We are thus clearly seeing the contraction of the national vegetal covering.

Previously, forest resources were neglected, and their yield exceeded the encroachments of neighboring residents. However, these resources are now attracting the interest of all parties seeking to invest. Domestic groups, which have forest areas at their disposal, now harvest an annual yield that helps them carry out specific projects.

### NEPAL

#### **Japan Grants 3 Million Dollars for Forestry Development Plan**

*BK0906170091 Hong Kong AFP in English 1651 GMT  
9 Jun 91*

[Text] Kathmandu, June 9 (AFP)—Japan has donated three million dollars to fund publicity for Nepal's forestry development programme, Nepali State Radio said Sunday.

"The Japanese International Cooperation Agency (JAICA) has granted an assistance of three million dollars for the publicity of various programmes relating to the forestry master plan for the next three years," the radio quoted a Forestry Ministry statement as saying.

Acting secretary of the Forestry Ministry, Purusottam Narayan Singh Suwal, signed the agreement Sunday with a senior JAICA official, the radio said.

Nepal had launched in July 1989 a 1.7 billion-dollar, 21-year "forestry master plan" with the help of Japan, the United States, Britain, the Scandinavian and Nordic countries, the World Bank and the Asian Development Bank, an official Forestry Ministry source said.

To make the plan a success, good publicity was necessary together with the participation and cooperation of the people, the source said.

# **Zalygin Sees Shortcomings in National Environmental Policies, Institutions**

91WN0505A Moscow TRUD in Russian 5 Jun 91 p 2

[Article by Sergey Zalygin, chairman of the Ekologiya i Mir [Ecology and Peace] Association, under rubric: "An Ecologist's Notes: Nature Day—Eternity Day"]

[Text] Nature Day... World Environmental Protection Day...

Doesn't the word "day" sound strange in this context? Doesn't it reflect a certain waning of an awareness that reduces a global problem of our existence to a one-day propaganda measure? Let's just talk about this topic for a day, but when what? Will everything continue in the way that it has been going up until now?

Why not—by analogy, of course—institute a "life day"? Or an "eternity day"? Because nature is the cause of life. It is only through nature that life exists, life which, even though it is not itself eternal, it is nevertheless part of eternity, isn't it?

But still we understand absolutely all the world surrounding us only as the environment for our own habitation, and it is well known how we deal with property, especially if it is not personally owned, but belongs to the state and the nation. Nature was created only once, and it can also be enjoyed only once, without any hopes of renewing it or rejuvenating it. So it is already becoming clear to us that the time period during which nature and man can coexist is expiring and that it is still possible to do something to postpone the fatal date and the next "Nature Day"—alas!—the only one in the yearly cycle.

Properly speaking, nowadays there is no longer an area of human activity that does not have a direct relationship to the ecology.

The reader certainly knows already that for me ecology is primarily the problem of water resources, or, to put it more precisely, the problem of water reclamation, the so-called improvement of the land for purposes of increasing fertility by changing the water balance on that land.

Once again that word "improvement"! But how frequently do our noble impulses end up as inconceivable worsenings? Once again there is an analogy between social phenomena and the use of the environment: at one time we thought of changing the nature of man. We did not succeed, but we caused incredible damage on nature as such.

The initiator, and also to a certain degree the direct originator, of our gigantic construction projects was no one else but Stalin.

The first experiment conducted by Stalin in the mid-1930's was the White Sea-Baltic Canal.

As a result of the repressions, and primarily the liquidation of the "kulak class," the state had at its disposal at

that time millions of unskilled and unpaid working hands, and it was necessary to find some application for them.

It was precisely earth-moving operations, which were almost unmechanized (and partially also the concrete-pouring operations), that required neither skill nor quality, and from that point of view the White Sea-Baltic Canal justified itself not only technically, but also ideologically, inasmuch as it became a "higher" educational institution in the area of "re-forging" and socialist competition.

The press at that time was replete with rapturous articles. Authors (including Gorkiy himself) "responded" with fighting essays. Performing artists performed at construction sites. And the "Belomorstroy" [White Sea-Baltic Construction Project] trade mark was assigned to tobacco and other articles (and is preserved to this day).

The reindoctrinated participants in the construction—the laborers and the highly skilled specialists who were awarded state decorations—were proud of it. A rather large number of those people also possessed the title of professor, and their work at Belomorstroy and on the Canal imeni Moscow was something that added to their fame.

But no one at such time considered or even recalled (or recalls now) the human sacrifices that resulted from the "nationwide" construction projects.

The experiment was conducted and it became even more widespread during the postwar years when carrying out the "Great Stalinist Plan for the Transformation of Nature" at such construction sites as the Kuybyshev, Volgograd, Tsimlyansk, Bratsk, Krasnyarsk, and Novosibirsk GES, the Karakumy and Volga-Don Canals, and many other projects.

And that is precisely the "methodology" that has existed in the USSR to this day. To a certain extent it has indeed changed (for example, the people working at the construction sites are no longer prisoners, but are hired ones). And also to a certain extent there has been an improvement in the visibility of a project's having passed through all the levels of technical evaluation, as well as a more "intelligent" appearance as a whole. But the factor that continues to be the main one is not technical evaluation, but coordination, that is, the opinion of variously highly placed individuals.

The misfortunes have been aggravated by the fact that the USSR does not have any environmental-protection legislation. Nor does it exist, and one could scarcely expect it to exist, in the currently existing state system (or, rather, lack of system).

A totalitarian state cannot be legal if only because, even if it does create a law, it does so for itself alone, and that state itself must be brought to responsibility for having violated the legality. The law has in mind the existence of a minimum of two completely equal juridical entities,



the relationships between which are regulated by that law, but if there is only one entity (the state), the law becomes a fiction. In essence, that law is not needed: instructions would suffice.

In their turn, the answerable entities must possess the right of ownership and must possess property, and it is that property that they legally protect and multiply. If there is nothing to protect, then what purposes does the law serve?

And if the state has not been prepared for privatization, if it still cannot define the reciprocal obligations between itself and the newly fledged property owner, won't we be putting our head in our hands a few years from now as a result of this "measure," and won't we begin a perestroika of the current perestroika? Apparently the need for privatization has been proven. But any proof requires practical execution—how? when? in what volume? with the participation of what individuals? under what conditions, including ecological? Are we really supposed to believe that this is normal, that the word "privatization" in our country does not live side by side with the word "ecology," or that this neighborliness does not exist?

Well, for the time being, this question is not resolved, and the activity of all our state environmental-protection organizations—committees, commissions, and ministries—cannot be effective. And might be a complete farce.

Under these conditions not even the court can rise to the defense of the environment. In the USSR not a single major project involving the use of the environment has ever been opposed in the court. There has never been any court proceeding of any significance involving an environmental-protection case.

Individual poachers have been brought to court.

The fines imposed on enterprises that pollute the water, the air, and the land are insignificant and are paid for at the expense of the very same state funds.

In the United States as many as 85 percent of all projects involving the use of the environment pass through the court system, and that is natural: no use of a natural resource has even been, or ever could be, unconditionally beneficial for everyone, and only the court is capable of weighing all the pros and cons. In the United States also, before beginning to design a particular project involving the use of the environment, one must report that fact in the press.

Perestroika is frequently explained by only political motivations, and then by economic ones, but no one ever brings either type of motivations to their end. However, in the final analysis, the most essential thing is the ecological condition of the country and the state, and its prospects. In the process of perestroika, ecological disasters are becoming, essentially speaking, everyday phenomena. According to the most modest computations, 16 percent of the entire territory in the USSR is already

disaster territory which, according to the standards that are generally accepted in the civilized world, is unsuitable for the normal existence of man.

We combat ecological disasters in a procedure of applying emergency measures, not eliminating, but smoothing over the consequences and in no way exerting an effect upon the causes of those disasters. But ecological well-being cannot be achieved either first of all, or simultaneously with political and economic well-being. It can become only a remote result of the stabilization of both of them. Ecological well-being is possible only if there is intelligent production activity by the state and society.

Adam Smith defined production in three components: labor, capital, and nature. But we work half-heartedly, we do not have any correctly organized labor, and we do not have capital. Essentially speaking, we have reduced all of production to nature, to the use of its resources. You have to admit that socialism posed a threat to Adam Smith!

The question arises: if that is so, then don't we have any hopes for a stable ecology?

Alas, that might be so. But there is something else that is clear: under these conditions, ecological crimes must be stopped by the state with special rigidity. The public must be especially vigilant, and must not allow anyone to twist it around his little finger. Because the pernicious projects—all those changes of runoff; dikes like the Leningrad and Karagobaz dikes; water reservoirs like the Kakhovskoye Reservoir; water dividers like the Astrakhan water divider; and others—all these backslidings to the Stalinist mania for gigantic projects continue to be presented as achievements of our recent past, and it is recommended to us that we continue to proceed along the path of these "achievements."

State criminals in the field of the use of the environment currently feel that they are the heroes of the day, since they do not encounter any resistance on the part of the USSR Supreme Soviet's Committee on Ecology or the Ministry (State Committee) for Environmental Protection.

All of this is occurring before our very eyes, frankly because the public is not organized, and the departments, which had started to lose control of themselves at the beginning of perestroika, are beginning once again to organize into powerful offices and firms, and one can observe the creation of a neobureaucracy that is a bit stronger than the "stagnant" one. That one was afraid of the leadership, but this one is afraid of no one.

The ecology must self-determine itself more precisely in the modern world—no one can do that for the ecology.

The farther that science goes, the more it subdivides into specialties (and there has already arisen the science that deals with the names and specializations of individual sciences). At the same time it also, as it were, subdivides

nature into small and then even smaller pieces, swiftly crowding out our ideas concerning nature as being an integrated phenomenon and organism. Ecology, for the first time since the ancient Greeks, perceives nature as something whole, and in that sense it is close to philosophy and religions (or they are close to it).

All the sciences prior to ecology developed and satisfied at the expense of nature man's newer and newer needs. Ecology is the first science to pose the question of limiting those needs. It is a new dietology of human existence.

Thus, ecology is just as much scientific as it is suprascientific. Ecology is just as much a science as it is a social movement. In and of itself, as the sum of various deductions, it does not cost anything and will not achieve anything, will not achieve any real results.

Unlike classic science, and even moreso modern science, it must be not only comprehensible to people, but must also become part of their everyday life, part of their psychology.

Thus, it defines the forward movement of the new "ecological civilization," in which there is a change in the role and status of science, and, I repeat, changes from a means of developing human needs into both a means and a method of limiting them. The transition from one civilization to another has always been difficult and dangerous.

Nor do we have ecological education. Where are we to get it? How can we get it if there is no law governing the citizen?

Under these conditions education becomes propaganda, and nothing more.

But here is something interesting: all that has to happen is for a system of individually owned farms to arise, and the farmers develop an interest in acquiring ecological education. Why is that so? Well, because ecologically pure agricultural produce costs much more. And the psychological factor, of course, plays a role: people want to begin a new job cleanly, and to oppose it to the unclean practice that prevails all around.

So we must definitely not postpone ecological education until the time when environmental-protection legislation has been created and goes into effect.

Moreover, ecological education must ennoble our education in general—secondary and higher, technical education and education in the humanities.

The fact of the matter also is that, whereas in foreign countries "personnel factories" at all levels are producing enrichment specialists and every kind of enrichment is, of course, selfish, we are training specialists in destroying society and the state, and that altruism actually proves to be a type of irresponsibility that is worse than any other kind of selfishness.

Ecology as a science, as a way of life, as a standard of behavior, is that ideal that has remained for us unspotted and irreproachable.

And what is true continues to be true: education without an ideal is no more than technology, technology that is not far-reaching, and that often is also blind. It is another matter that the ideal may prove to be a false one. We have gone through that. We know that, but, for the ecological ideal this is precluded. In that ideal there not only is no falsehood, but also, in principle, there cannot be any falsehood, to the same degree in which it does not exist in any activity that is aimed directly at the salvation of man. Activity of this kind can be successful or unsuccessful. That is already another matter, but the principle always remains high and noble. Having said that, I would like to end my notes, but first I would like to formulate my proposals:

—we need an international ecology school;

—we need an international ecology inspectorate;

—we need an international ecology court.

#### **Official Views Pollution Effect on Public Health, New Legislation**

*91WN0468B Moscow TRUD in Russian 15 May 91 p 4*

[Interview with V. Chiburayev, chief of the Sanitary-Phylactic Main Administration of the USSR Ministry of Health, and USSR deputy chief sanitary inspector, by I. Tsarev: "Delay May Mean Death"; date and place not specified; first paragraph is TRUD introduction]

[Text] Today the level of civilization of a country is determined, above all, not by technical achievements and industrial might, but by the state of public health and the life expectancy of its population. In terms of these indicators, the Soviet Union, alas, stands in one of the last places. We asked V. Chiburayev, chief of the Sanitary-Phylactic Main Administration of the USSR Ministry of Health, USSR deputy chief sanitary inspector, to comment on the situation.

[Tsarev] The state of health of the population of our country, it is no mere chance, calls forth acute alarm among physicians. Judge for yourself:

- In terms of life expectancy of women, the Soviet Union is in 47th place (among 60 countries of the world);
- Soviet men in terms of this indicator even find themselves in 54th place;
- infants during their first year of life die in our country at twice the rate as in the United States, and at four times the rate in Japan;
- death in childbirth in our country is six times higher than in America. . What is the reason? What sort of epidemics take away the lives of Soviet people?

[Chiburayev] Epidemics have nothing to do with this. The statistics indicate that 80 percent of all cases of death are due to chronic noninfectious diseases. Already during the pre-school age, about 20 percent of the children have chronic diseases, and functional deviations in the state of health are observed in every small child. And, as research has shown, plants, factories, and enterprises frequently make their sad contribution to this dismal picture. . . . In many regions of the country, the air, water and soil have been strongly polluted. In 125 cities, a tenfold excess of the maximum permissible concentration of harmful substances in the air is registered. And this means that 40-50 million people are subjected to constant negative influence.

Drinking water produces a high level of viral hepatitis disease in our country. Every year this illness affects approximately half a million people. According to the laboratory research data of the health and epidemic service, every fourth sample of water is dangerous to health in chemical respect, every fifth—in bacteriological respect. . . .

Soil contaminated with pesticides and the salts of heavy metals also makes the situation worse. Incidentally, on the territory of the USSR there exist permanently up to now 14 natural breeding grounds of the plague. And the total area on which there exists the potential danger of being affected by this disease comes to 209 million hectares.

One more significant factor is the unfavorable working conditions that call forth professional disease. They inflict enormous harm, not only to health but also to the economy. Thus, the economic losses from a person's contraction of the "vibration disease" comes to about 20,000 rubles. In 1989 more than 6,000 persons were declared to be afflicted with that disease. All in all, every year 12,000 are registered as suffering for the first time from professional poisonings and diseases.

If we use military terms, today this "army", although morally prepared for any battle, is stripped, barefoot, and poorly armed. We lack the main weapon—a law which could stand in the path of this calamity. And when the authorities were confronted with the choice—to close a filthy enterprise, as demanded by the sanitation inspector, and thus to improve the surrounding region, or to continue production, having closed their eyes to the possible consequences, the decision was always identical. The legislative acts in effect did not legally strengthen the responsibility of all state organs, enterprises and institutions for the nonfulfillment of requirements of the normative documents in regard to the guarantee of the medical and epidemiological well-being of the population. And for this reason we place great hopes on the new health legislation, the draft of which has been submitted to the USSR Supreme Soviet. In accordance with the most important international act—the Human Rights Charter—the right of Soviet citizens to an environment not exerting a harmful influence on the health of the present and future generations was formulated.

[Tsarev] Will the new sanitation law not be an empty declaration of our rights?

[Chiburayev] It envisages guarantees of its practical implementation. This is the right of citizens to receive complete information on the state of the environment, the right to compensation of damage connected with the influence of the environment, the possibility of appealing in court against the actions of state organs and officials who violate the indicated rights. . . . Thus, for the first time in the practice of Soviet legislation, it makes provisions for responsibility for damage to the health of people, a new system of fines has been developed—for officials in the amount of three to five salaries, for citizens—200 rubles. Criminal proceedings are not excluded. . . .

[Tsarev] I would like to believe: The new law will help to bring about a change in the situation. But when will it enter into force?

[Chiburayev] Russia has already adopted such a law, but the USSR Supreme Soviet keeps delaying the time of its review, although delay in this question, as they say, may mean death. According to calculations by experts, the introduction of the new legislation will require expenditures in the amount of about R2.5 billion. But because of the absence of legal regulation of the provision of sanitary-epidemiological well-being, the state suffers much greater losses—about R33 billion a year. This sum consists of losses from the unproduced national product in connection with the diseases, disability, premature mortality, reduction of labor productivity, and many other components. "Economizing" on health has always turned out to be very expensive. . . .

#### Public Hearings on Ecology Held in Moscow

LD0806201191 Moscow TASS in English  
1930 GMT 8 Jun 91

[By TASS diplomatic correspondents Mikhail Ivanov and Leonid Timofeyev]

[Text] Moscow June 8 TASS—Public hearings on problems of ecology and development ended here today. They were organized by the International Centre "for our Common Future" (Geneva) and the International and Soviet Committee of Assistance to the United Nations Conference for Environment and Development, due to be held in Brazil in June 1992.

Participants in the meeting discussed the impact of conversion of arms-manufacturing production on the environment and development, new economic models of steady development, legal aspects of attaining stable development on the national and international levels and the role of nongovernmental organizations in the solution of environment problems.

An appeal of USSR First Deputy Prime Minister Vitaliy Doguzhiyev to participants in the hearings, that was circulated here, says: "It is important to use in the best

possible way processes of preparation for the conference for achieving a radical improvement of the ecological and socioeconomic situation in each country and taking new practical steps on the national, regional and world levels."

Maurice Strong, UN assistant under-secretary general and head of the preparatory committee of the conference, who took part in the hearings, told journalists that it was necessary to work for combining the economic and ecological interests.

The hearings made it possible for representatives of public organisations to set forth their views on environment and development problems and to inform governments of them. As a result of a two-day discussion, recommendations on the agenda of the Brazil forum were worked out.

### Defense Ministry, Ecologists Have 'Much Mutual Work Ahead'

LD0806025791 Moscow Radio Moscow World Service in English 2110 GMT 7 Jun 91

[Text] The public in many countries recently marked World Environment Protection Day. In an interview for Radio Moscow, Viktor Revyakin, the chairman of the Committee for the Rational Use of Natural Resources of the parliament of the Russian federation, touches on two problems: ecology and disarmament. The Russian federation is now on its way to a market economy, and nature in the republic, which has already been badly damaged, may find itself under even greater pressure on the part of businessmen and very energetic persons. That's why it's necessary to have a system of economic nature tenure. There should be ecological fines, taxes, and privileges. It's necessary to pay for everything that concerns the health of the people and nature, and there should be no untouchables, such as the Ministry of Defense. Incidentally, in the European Community the ministry's activity, like that of every businessman, is controlled by 93 documents, and we in this country are only on the way to that. So far, we not only paid lavishly for the needs of defense, but we never gave enough attention to how it all affects the environment. Military security and nuclear security in the long run mean ecological security, says Viktor Revyakin. Ecologists should cooperate closely with military structures.

Last month, says Viktor Revyakin, I met with Defense Minister Dmitriy Yazov. He told me what the armed forces are doing to protect the environment, and it seems they are doing a lot. The military were the first to do something about the empty iron fuel barrels which are scattered around the whole coast of the Arctic Ocean. There is a sanitation program for military settlements. Much attention is given to ecological safety near military airfields. But, of course, the Defense Ministry will have to do much more. Disarmament would pose its own problems since it would be necessary to eliminate chemical weapons and reduce a considerable part of strategic weapons, so there will be a great deal of joint work.

But, even together with the ecologists, it will not be easy for the military to convince the frightened population that it's quite safe to live near the places where weapons are being destroyed. That problem can be solved only through accord, says Viktor Revyakin. There should be a balanced, expert-like approach. If the building of dangerous enterprises is connected with even the slightest damage to national resources or inconveniences for the local residents, they should be paid compensation. It's not accidental that the new law on sanitary welfare of the population contains a provision that every citizen of the Russian federation has the right to compensation for the damage done to him by any ministry or department. In other words, concluded Viktor Revyakin, there is much mutual work ahead for the military and the ecologists.

### Cabinet Adopts Resolution on Chernobyl Program

PM1106092491 Moscow PRAVDA in Russian 8 Jun 91 Second Edition p 1

[Unattributed report under the rubric: "At the USSR Cabinet of Ministers: Single Chernobyl Program"]

[Text] In order to eliminate the aftereffects of the accident at the Chernobyl AES [nuclear electric power station] and the situation arising from this accident, the USSR Cabinet of Ministers resolved that:

The RSFSR, Ukrainian SSR [Soviet Socialist Republic], and Belorussian SSR governments and Union ministries and departments participating in the implementation of the state Union-republic program of urgent measures for the years 1991-1992 to eliminate the aftereffects of the accident at the Chernobyl AES should unconditionally ensure that the targets envisaged by the said program for 1991, as well as by the republic programs to eliminate the aftereffects of the accident at the Chernobyl AES, are fulfilled.

They should ensure that work to conclude job contracts to build homes and cultural, consumer, social, and municipal service facilities for citizens resettled from contaminated regions is completed in June 1991.

The USSR Ministry of Health, the RSFSR Council of Ministers, the Ukrainian SSR Cabinet of Ministers, and the Belorussian SSR Council of Ministers should:

- Adopt measures in June and July 1991 aimed at improving the health agencies' structure in the monitored zones; recruiting and retaining medical personnel to work there, including contract workers; and completing the supply of up-to-date equipment and medicines to medical institutions;
- speed up the process of comprehensive investigations on citizens living in the monitored zones, and compile on this basis a medical and biological database on the state of the population's health;
- ensure together with the USSR General Confederation of Trade Unions that measures are put into effect in 1991 to improve the health of the population, first and foremost of children and teenagers, in the regions affected by the accident at the Chernobyl AES.



Ministries and departments of the USSR and the three union republics are instructed to complete in 1991 the creation of a system of departmental and state radiation monitoring of agricultural and food products, and of water and soil in each population center of the monitored zone, and to significantly improve health education and public information work among the population on questions concerning the effects of radiation.

The USSR State Commission on Emergency Situations, the USSR Ministry of Economics and Forecasting, the USSR State Committee for Science and Technology, the USSR Ministry of Finance, the USSR Ministry of Health, the USSR Ministry of Agriculture and Food, the RSFSR Council of Ministers, the Ukrainian SSR Cabinet of Ministers, the Belorussian SSR Council of Ministers, and other interested ministries and departments should:

- ensure that the single long-term state Union-republic program to protect the population from the aftereffects of the Chernobyl disaster is finalized and submitted to the USSR Cabinet of Ministers in September 1991;
- the USSR Ministry of Atomic Power Engineering and Industry together with the Ukrainian SSR Cabinet of Ministers and other interested ministries, departments, and organizations should determine by 1 September 1991 the procedure and dates for decommissioning the Chernobyl AES power units.

The RSFSR Council of Ministers, the Ukrainian SSR Cabinet of Ministers, the Belorussian SSR Council of Ministers, and a number of Union ministries are charged with adopting measures to provide the population living in regions contaminated with radioactivity as a result of the accident at the Chernobyl AES with fuller supplies of clean food products in accordance with reasonable consumption norms.

A number of other measures were stipulated to eliminate the accident's aftereffects.

The USSR Cabinet of Ministers also detailed a set of measures to create the necessary conditions to send children from the regions affected by the accident at the Chernobyl AES for recuperation in foreign countries.

#### **Goskomgidromet Chairman Izrael on Chernobyl Contamination Zones**

*91WN0455A Moscow PRAVDA in Russian 26 Apr 91  
Special Edition pp 1-2*

[Article by Yu.A. Izrael, chairman of the USSR State Committee for Hydrometeorology: "Overview of the 'Special Zone'"]

[Text] The zone of intense monitoring takes in 786 communities in 26 rayons of Bryansk, Kiev, Zhitomir,

Mogilev, and Gomel Oblasts, with a population of 272,800, representing one out of every three inhabitants.

An article about the contamination of rayons within the territory of the USSR after the Chernobyl disaster is on the second page of the special edition.

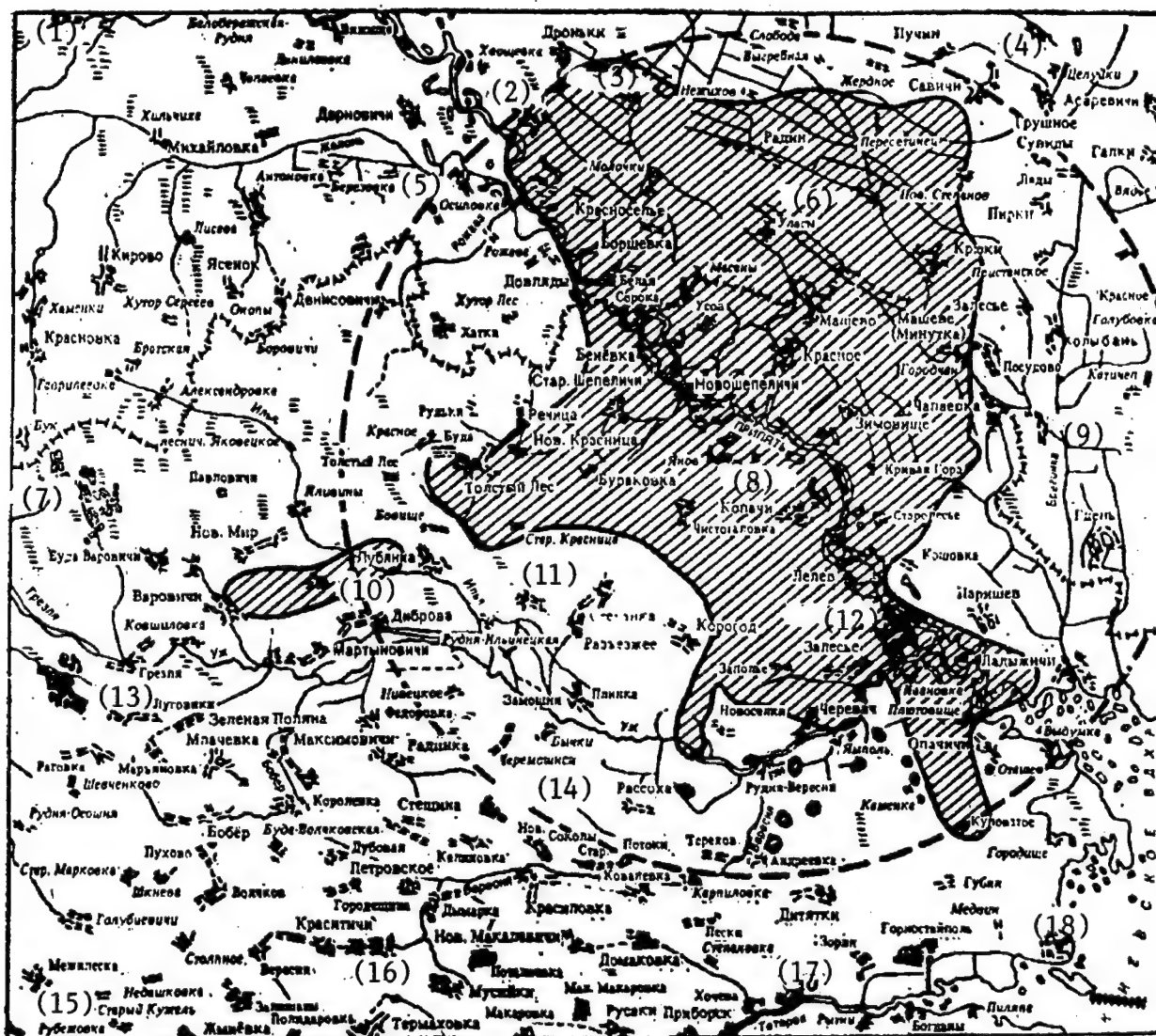
In 1990 USSR Goskomgidromet [State Committee for Hydrometeorology] worked with the USSR Ministry of Geology, USSR Ministry of Health, USSR Academy of Sciences, the State Commission on Food and Procurements of the USSR Council of Ministers, USSR Civil Defense, and concerned republic organizations in the RSFSR, BSSR, and UkSSR on measures to supplement earlier studies through the continued clarification of radiation conditions and the regular collection and analysis of data within the zone of radioactive contamination.

Radioactive contamination in Tula, Kaluga, Orlov, Ryazan, Belgorod, Lipetsk, Voronezh, Leningrad, Tambov, and Kursk Oblasts and three rayons of Smolensk Oblast in the RSFSR, Kiev, Zhitomir, Rovno, Chernigov, Cherkassy, Vinnitsa, and Chernovtsy Oblasts in the UkSSR, and Gomel, Minsk, Brest, and Mogilev Oblasts in the BSSR was the subject of additional studies using aerial gamma spectrophotometry and ground observations in 1990. These studies confirmed the earlier location of the isoline of pollution by cesium-137 at 40 r/km<sup>2</sup> and 15 r/km<sup>2</sup> depicted on earlier maps at the beginning of last year (see PRAVDA, 17 April 1990) and clarified the location of the 5 r/km<sup>2</sup> isoline in Orlov, Tula, Kaluga, and Chernovtsy Oblasts and the 1 r/km<sup>2</sup> isoline in other territories. The clarification of the 1 r/km<sup>2</sup> isoline was planned earlier. After all, the large-scale photographic surveys of the territory from the air that began in early May 1986 had revealed, in addition to the severely contaminated areas, a zone of light pollution, considerably lower than the criterion set for that time, and this is why the situation was clarified later because of the huge areas of contamination measuring 1 r/km<sup>2</sup>.

Measurements to verify information and obtain more detailed data were conducted in the BSSR, UkSSR, RSFSR, and GSSR (Georgian Republic). Only insignificant changes were discovered in the BSSR and UkSSR. In the BSSR, for example, there were additional spots with a pollution density of 1 r/km<sup>2</sup> in Vitebsk Oblast (four communities with pollution higher than 1 r/km<sup>2</sup>), and the exact location of the 1 r/km<sup>2</sup> isoline in Minsk, Brest, Grodno, Gomel, and Mogilev Oblasts was defined more precisely.

Special attention was paid to many oblasts in the RSFSR. When the RSFSR Congress of People's Deputies declared the RSFSR rayons contaminated with radioactivity as a result of the Chernobyl accident a national ecological disaster zone and scheduled a discussion of the union republic program of clean-up operations in Bryansk, Kaluga, Orlov, Ryazan, Smolensk, Tula, Kursk, Lipetsk, Belgorod, Voronezh, and other oblasts of the RSFSR at the next session of the RSFSR





Density of Plutonium-239 and Plutonium-240 Contaminants

## Key:

1. 0.1 r/km<sup>2</sup> isoline

2. Boundary of 30-km zone

3. Zone of contamination exceeding 0.1 r/km<sup>2</sup>

(1) Antonov, (2) Orevichi, (3) Pogonnoye, (4) Prosmychi, (5) Vepry, (6) Kulazhin, (7) Vilcha, (8) Prip'yat, (9) Chikalovich, (10) Vesnyanoye, (11) Ilyinty, (12) Chernobyl, (13) Poleskoye, (14) Ordzhonikidze, (15) Maryatin, (16) Volodarka, (17) Oranoye, (18) Strakholesye

Supreme Soviet, USSR Goskomgidromet conducted studies in conjunction with the USSR Ministry of Geology and other agencies to clarify and take additional measurements of the radiation conditions and density of pollution by radioactive isotopes in these oblasts and in Leningrad and Tambov Oblasts and Krasnodar Kray. In Bryansk, Tula, Orlov, and Kaluga Oblasts, detailed photographs

were taken earlier (see PRAVDA, 20 March 1989, and NAUKA I ZHIZN, No 9, 1990) and detailed data on Bryansk Oblast, Plavsk, and several cities in Tula Oblast were reported back in May 1986. Some clarification, however, was required even here. The 1 r/km<sup>2</sup> isoline in these and other oblasts will continue to be checked in the future.

The contaminated areas of some of the most highly polluted oblasts in the RSFSR with varying densities of cesium-137, according to the results of the studies conducted in December 1990, are listed below.

Republic	1-5* r/km <sup>2</sup>	5-15 r/km <sup>2</sup>	15-40 r/km <sup>2</sup>	over 40 r/km <sup>2</sup>
RSFSR, km <sup>2</sup>	39,280	5,450	2,130	310
BSSR, km <sup>2</sup>	29,920	10,170	4,210	2,150
UkSSR, km <sup>2</sup>	34,000	1,990	820	640
USSR, total	103,200	17,610	7,160	3,100

\* To be clarified by the findings of ground observations in 1991.

It is significant that the detailed studies conducted in 1990 confirmed the anticipated low levels of radioactive contamination in the oblasts listed above (with the exception of the four listed in the table below).

The zones of contamination with levels of 1-2 (and up to 3) r/km<sup>2</sup> discovered in Ryazan and Leningrad Oblasts are new in comparison with data published last year (see *NAUKA I ZHIZN*, No 9, 1990, and the book "Chernobyl: radioaktivnoye zagryazneniye prirodnkh sred" [Chernobyl: Radioactive Pollution of the Environment], published by Gidrometeoizdat in 1990). Small contaminated zones with these levels of pollution were also discovered in Belgorod, Lipetsk, Tambov, and Voronezh Oblasts.

Because the ground observations in Ryazan, Lipetsk, Belgorod, Tambov, Kursk, and Voronezh Oblasts in the RSFSR and Chernigov Oblast in the UkSSR were inadequate because they were of such short duration, the isolines on the map for the cesium-137 in these territories should be viewed as preliminary estimates of 1-5 r/km<sup>2</sup>. They will be checked in 1991 after the ground observations have been completed. In Krasnodar Kray and on the Black Sea coast (in the Georgian Republic), certain zones were found with cesium-137 pollution of up to 1 r/km<sup>2</sup> in Krasnodar Kray and 1-1.5 r/km<sup>2</sup> near Batumi and Sukhumi and in some small communities in the GeSSR; the density of cesium-137 pollution in Sochi is 0.4-1.4 r/km<sup>2</sup>, and the level of radiation is now equivalent to the global background: 10-15 mcr/hr.

The contaminated areas of territories with various levels of cesium-137 pollution in the RSFSR, UkSSR, and BSSR in December 1990, according to the results of the observations, are listed in the table:

Oblast	1.5* r/km <sup>2</sup>	5-15 r/km <sup>2</sup>	15-40 r/km <sup>2</sup>	over 40 r/km <sup>2</sup>
Bryansk, km <sup>2</sup>	7,120	2,820	2,130	404
Tula, km <sup>2</sup>	9,700	1,100	—	—

Kaluga, km <sup>2</sup>	1,350	3,560	—	—
Orlov, km <sup>2</sup>	8,840	180	—	—

\* To be clarified by the findings of ground observations in 1991.

The studies conducted in 1990 confirmed that the territories with a density of over 3.0 r/km<sup>2</sup> of strontium-90 and over 0.1 r/km<sup>2</sup> of plutonium-239 and plutonium-240 are localized primarily in the isolation and evacuation zones (see map). Some of the features of the strontium and plutonium pollution in the BSSR warrant further discussion. The contamination of republic territory by strontium-90 is of a more localized nature than the pollution by cesium-137. Spots with a soil pollution reading of more than 3 r/km<sup>2</sup> of strontium-90 in populated zones were found in Khoynikskiy Rayon in Gomel Oblast. Some small areas of the republic with a strontium-90 pollution rate of 1-3 r/km<sup>2</sup> (Vetkovskiy, Dobrushskiy, and Checherskiy Rayons in Gomel Oblast and Cherikovskiy and Krasnopol'skiy Rayons in Mogilev Oblast) were found north of the main zone.

The pollution of the soil by plutonium-239 and plutonium-240 at a rate of over 0.1 r/km<sup>2</sup> was found mainly in the evacuation zone. In Braginskii, Khoynikskii, and Narovlyanskii Rayons the level of plutonium pollution is 0.06 r/km<sup>2</sup> in some places and up to 0.1 r/km<sup>2</sup> in certain isolated spots.

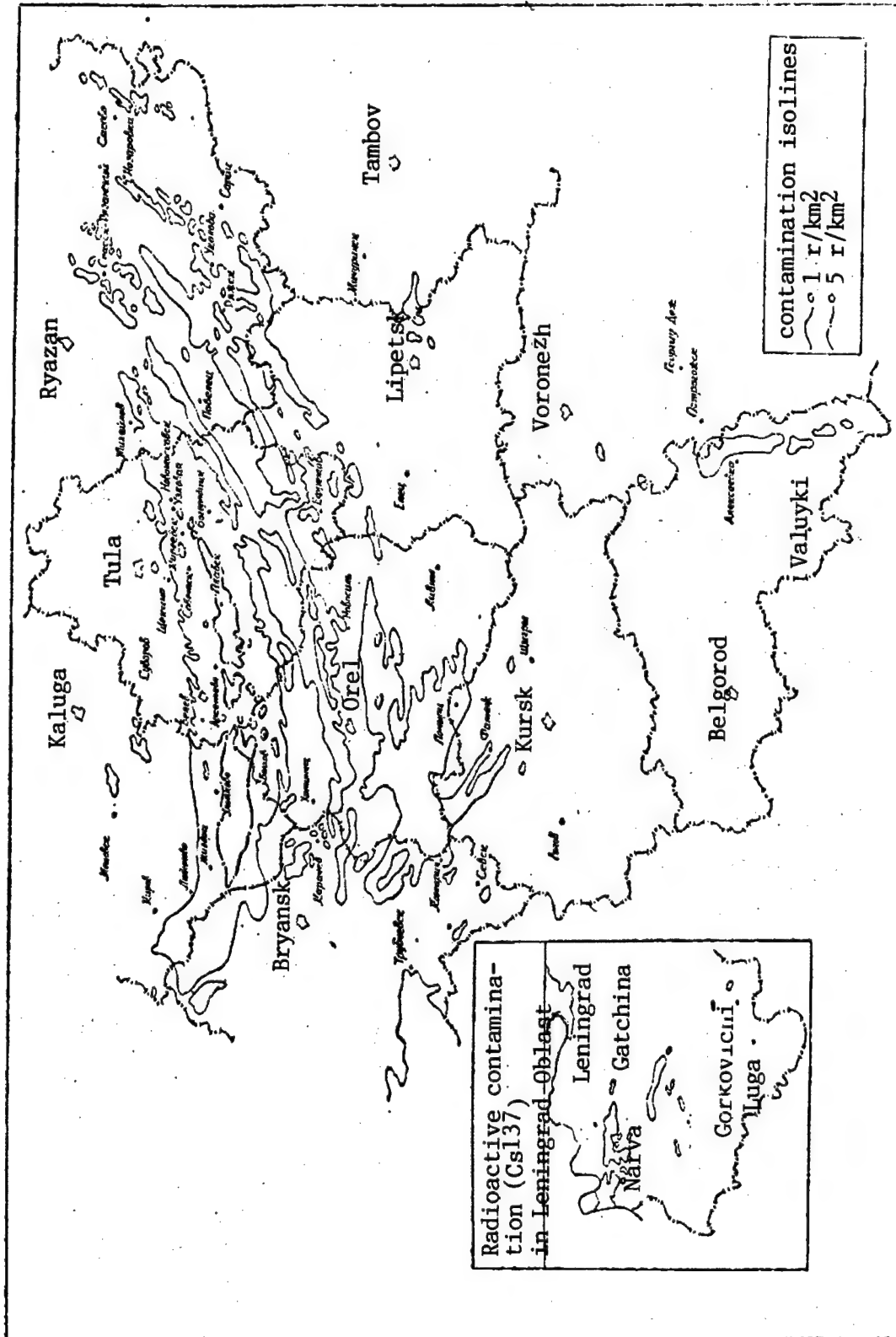
In the rest of the republic the density of plutonium contaminants in the soil is mainly equivalent to global fallout—0.0016 r/km<sup>2</sup>.

In the UkSSR some spots of high strontium-90 pollution (from 1 to 3 r/km<sup>2</sup>) are located west of the 30-km zone and virtually coincide with the evacuation zone, although they also take in a few populated communities (see map).

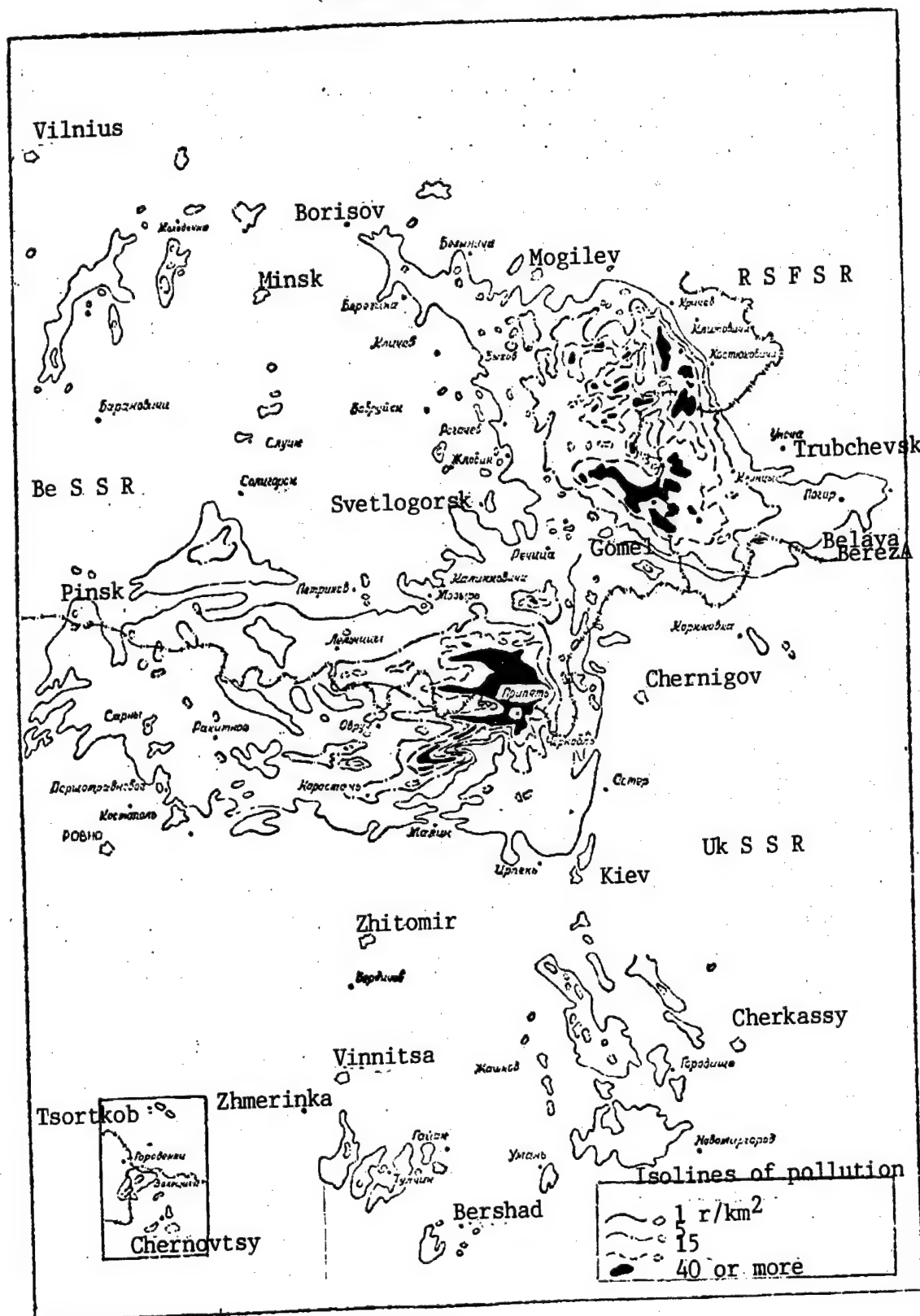
As earlier reports indicated, there are localized spots of "accumulated" cesium-137 pollution in the contaminated territories measuring a few square meters or tenths of square meters and located near water runoff points, in dips in the terrain, in places where ashes and manure are stored, and other locations where there is a high concentration of radionuclides and where the density of contaminants might be higher than in adjacent territories. These localized "points" can be eliminated (and are being eliminated) quite effectively by local services during decontamination operations. These spots can only be detected by means of detailed ground measurements, and these are being conducted by the USSR and republic goskomgidromets in conjunction with organizations of other ministries and departments.

The maps were compiled as part of the work on the union republic program of emergency measures in 1990-1992 to eliminate the after-effects of the accident at the Chernobyl Nuclear Power Plant [AES] in line with the decree of the USSR Supreme Soviet of 25 April 1990 "On the Unified Program for the Elimination of the

## Kaluga-Tula-Orlov Zone of Radioactive Contamination (Cesium-137) and Adjacent Territories



**Bryansk-Gomel-Mogilev and Kiev-Zhitomir Zones of Radioactive Contamination  
(Cesium-137) and Adjacent Territories**



After-Effects of the Accident at the Chernobyl AES and the Situation Connected With This Accident" and were discussed and approved on 26 December 1990 by the interdepartmental environmental radiation monitoring commission of USSR Goskomgidromet with the aid of representatives of local soviet organs and public organizations. The maps were based on the combined findings of aerial gamma spectrophotometry and ground observations. Analyses of around 100,000 additional soil samples to measure the cesium-137 content were taken into account when the maps were being compiled. The maps were sent to republics, oblast centers, and concerned organizations, were circulated widely by the Main Administration for Geodesy and Cartography, and were reprinted in republic and oblast newspapers.

In addition to photographing the entire territory and individual communities in 1990, USSR Goskomgidromet took radiation measurements on each lot (around 500,000) in the communities in the monitored zone (with a density of cesium-137 contaminants ranging from 5 to 40 r/km<sup>2</sup>, as envisaged in government order PP-36202 of 6 September 1990) in conjunction with concerned ministries and departments and in accordance with the state program. The findings were collated and analyzed directly in the republics. As for the numerous requests from local soviet organs and the population for detailed ground observations of populated communities with a density of cesium-137 contaminants of around 1 r/km<sup>2</sup> or slightly higher, this is also being done, but it will be completed sometime in 1991 or 1992 after the completion of the main assignment the USSR Supreme Soviet set for the rating of each household in the communities in the monitored zone. The total number of lots to be surveyed is around a million at this time.

Therefore, the radiation surveys envisaged in the program were completed in 1990. They indicated that the migration of the radioactivity has been negligible: Wind dispersion is not changing the location of the isolines, although it can increase the amount of radioactivity in the air slightly.

The content of radionuclides in the lowest stratum of the atmosphere near the ground is being measured carefully in the territories affected by the accident at the Chernobyl power plant. According to the findings of regular observations, even in the most highly polluted territories (the 30-km zone of the power plant and the cities of Pripyat and Chernobyl), the concentration of radioactive substances in the air (including the most "critical" level of plutonium inhalation) were only one-half or one-third as high in 1990 as the levels stipulated in the NRB-76/87 radiation safety standards, although they were slightly higher than background levels (because of wind elevation); in other zones with lower levels of pollution, the content of radionuclides in the air was only a fraction as high as in the accident zone and corresponded to background values.

Vertical migration by radionuclides penetrating the soil can reach depths of 20-25 centimeters depending on the type of soil, but most of the contaminants (80-90 percent) are in the top five-centimeter soil layer.

The quantity of radionuclides washed off the soil surface has been insignificant, but this has occurred and has polluted rivers and reservoirs. For this reason, water pollution levels are monitored constantly.

In the rivers flowing through the zone contaminated by the accident at the Chernobyl plant in 1986, the concentration of cesium-137 in 1990 was lower than in 1989, and the concentration of strontium-90 stayed approximately the same. In the Prip'yat River (in the city of Chernobyl), the concentration of cesium-137 was 6.6 ra/l, and the concentration of strontium-90 was 22 ra/l (1 ra/l = 10<sup>-12</sup> r/l).

In the rivers flowing through the Kaluga-Tula cesium spot (the Oka, Plava, Upa, and Zhizdra), the concentration of cesium-137 ranges from 1 to 6 ra/l, and in the rivers flowing through the Bryansk-Mogilev-Gomel spot (the Sozh, Iput, and Besed), it ranges from 1 to 50 ra/l (the maximum safe concentration, according to radiation safety standards NRB-76/87, is 1.5·10<sup>-8</sup> r/l, or around 15,000 ra/l).

In the rivers in the European part of the USSR (excluding the rivers flowing through the contaminated zones), the average concentration of strontium-90 in 1990 was the same as the previous year and was measured at around 0.65 ra/l. In the Kiev Reservoir (the southern part), the concentration was 5 ra/l for cesium-137 and 9 ra/l for strontium-90; in the lower reaches of the Dnepr in the Kakhov reservoir the concentration of cesium-137 was already below 1 ra/l, but the concentration of strontium-90 was only slightly lower (2-9 ra/l). The concentration of strontium-90 remained the same in the other reservoirs of the series (the permissible maximum, according to radiation safety standards NRB-76/87, is 4·10<sup>-10</sup> r/l, or 400 ra/l). The overall activity of the bottom sediment (in all of the Dnepr reservoirs) due to silt pollution is around 6,000 curie units in the average reservoir of 43.8 cubic kilometers.

The average concentration of cesium-137 in the northwestern part of the Black Sea was 1.3 ra/l (as compared to 4.3 ra/l in 1986), and the concentration of strontium-90 was 0.74 ra/l.

The ice jams in the Prip'yat River in January of this year caused the water level to rise dramatically (by 1.5-2 meters near Chernobyl) and flood more than 30 percent of the bottomlands. The maximum concentration of strontium-90 near Chernobyl rose almost tenfold—to 100-160 ra/l, but remained below the maximum safe concentration (400 ra/l). Projections of the possible content and measurements of the strontium-90 in the Kiev Reservoir near Kiev indicated that the concentration would rise to 20-30 ra/l, or three-five times as high as usual (but 10-20 times below permissible limits).

The UkSSR Main Administration for Hydrometeorology's timely forecast (a week in advance) of this event



and the necessary information allowed subunits of the USSR Ministry of Defense and the UkSSR Main Administration of the River Fleet to take quick action to break up the ice jam and to lower the water level and the concentration of radioactive substances dramatically. The flood washed around 60 r of strontium-90 from the bottomlands—i.e., around 0.5 percent of the total quantity there. This proved that ice conditions in the bottomlands of the polluted territory must be monitored carefully.

As far as we are concerned, all orders for "ecological" maps should focus on the presence and mobility of various radionuclides in different spheres, the possibility of their concentration in various locations under different conditions, and their biological accessibility, which would ultimately allow for the calculation (in combination with experimental corroboration) of the equivalent radiation dosage for the human being, and for any living organisms during the drafting of environmental laws. Unfortunately, maps of this kind do not exist yet (the USSR Academy of Sciences and several other agencies have been requested to compile them), and even the procedure of drawing up maps of this kind has not been finalized yet.

I was quite pleased when I heard that the people's deputies of the UkSSR who drafted the law of the UkSSR "On Laws Governing the Territory Contaminated by Radioactivity" (Article 10) had stipulated that the UkSSR Council of Ministers would provide the population of the Ukraine with information on radioactive conditions in the territory.

This is further evidence of the logical chain of public information. We should recall that the USSR and republic goskomgidromets and the agencies working with them were criticized for not keeping the population informed. I must repeat that complete information was provided in a timely manner to government commissions and union, republic, and oblast authorities, and they were the ones who should have made the decision to inform the population. In the case of USSR Goskomgidromet, this was even recorded in the appropriate directive documents (the transmission of information by USSR Goskomgidromet to local authorities and civil defense agencies, and by them to the population—USSR Council of Ministers directive 2153 of 9 October 1970).

I also want to say a few words about laws which have been passed and are being drafted in connection with Chernobyl.

Judging by the approved "Criteria for the Inhabitation of Rayons Affected by the Accident at the Chernobyl AES," the whole classification of territories and the danger of their inhabitation should be based only on the radiation dosage. In the laws that have been passed, however, territories (and the degree of danger connected with them) are classified according to the density of territorial pollution by long-lived radionuclides.

Of course, to some extent this is an affirmation of trust in the data and maps USSR Goskomgidromet worked on with several other agencies, including republic ones, but this approach is nevertheless somewhat illogical because it employs different methods for the categorization of areas in terms of the danger of their inhabitation and the organization of economic operations there. Everyone knows, after all, that in areas with differing densities of pollution the differences in the properties of the soil, the migration of radionuclides, and the distinctive features of the population's everyday habits and work can produce pronounced differences in dosages. From this standpoint, the density of pollution can be used only as an auxiliary factor in the categorization process, and this should be recorded in laws.

There is another question connected with laws which have been passed or are being drafted in connection with Chernobyl. It concerns the frequency, precision, and quantity of the necessary measurements. In spite of the huge quantity of current measurements, it will continue to grow, especially when the lowest, often scientifically unsubstantiated limits are instituted.

The lowering, for example, of the figures needed for the measurement of the density of plutonium pollution to  $0.005 \text{ r/km}^2$  (the law of the UkSSR "On the Laws Governing the Territory Contaminated by Radioactivity," Article 2, Paragraph 3) is associated in the law specifically with the properties of soils contributing to the high migration of radionuclides (in this case, plutonium) in plants; this is invalid because plutonium has extremely low migration potential in vegetation, and its critical means of entering the human organism is through the respiratory organs (with aerosol particles), and it is this entry that is governed by standards. In time the plutonium particles bond with the soil more tightly, and the danger of their wind dispersion decreases. In the 30-km zone in 1990, for example, the concentration of plutonium-239 and plutonium-240 in the air in Prip'yat was  $7.3 \cdot 10^{-19} \text{ r/l}$ , and it was  $2.2 \cdot 10^{-19} \text{ r/l}$  in Chernobyl (with a permissible maximum of  $3 \cdot 10^{-17} \text{ r/l}$ ).

Another example is the choice of  $0.02 \text{ r/km}^2$  as the minimal figure for the density of soil pollution by strontium-90 to define the zone of intense radioecological monitoring—a figure lower than the global pollution of territories by strontium-90 as a result of the experimental nuclear tests in the atmosphere in the 1960s (at this time the level in our country is  $0.03\text{--}0.035 \text{ r/km}^2$  even without the "Chernobyl" pollution). Given this approach, all of the territory of the UkSSR (and perhaps even the USSR) would be in the zone of intense radioecological monitoring even if there had been no accident in Chernobyl.

Several other figures have not been substantiated sufficiently either.

All of this results in a vast quantity of unnecessary measurements and a waste of energy and resources that could be channeled into truly necessary pursuits.

Apparently, in accordance with the new laws, most of the responsibility for the measurements will be borne by the republic (including the confirmation and expert appraisal of findings), and only the coordination of matters common to all areas will be the responsibility of the center.

We also realize that everything, even laws, can improve with time, and we hope that these remarks will be taken into consideration in the future, especially during the drafting and adoption of the union law (in its second reading). (After all, a decision has been made to coordinate union and republic laws in this area.)

The provision of republic, oblast, and rayon authorities with information by the USSR and republic goskmgidromets has already been organized; as I have already said, the maps and the results of photometric studies of the density of radionuclide pollution in 1990 have been published in republic and oblast newspapers and the findings of studies of individual households are transmitted to the consumer on the local level.

Of course, in spite of this, agencies of USSR Goskmgidromet (in the republics) receive many letters asking about radiation conditions in populated communities. Our replies contain detailed information about the density of soil pollution by radionuclides and explanations of the regulations governing the habitation of polluted territories.

When information about gamma radiation in 52 communities in the BSSR began to be published weekly in republic newspapers, the editors received many letters requesting the inclusion of information about conditions in other cities in these reports. In response to these letters from citizens, information about the gamma radiation in 73 populated communities in Belorussia is now published weekly in newspapers.

In large cities the level of radiation is almost the same as the background figures: up to 0.015 mr/hr in Kiev, Minsk, Slavutich, and Belaya Tserkov, and 0.013 mr/hr in Zhitomir.

I have already mentioned the trust and interest in our information. Once again I will repeat what I have said in earlier publications: that the USSR and republic goskmgidromets and all of the agencies working with us on the measurement and examination of the radioactive contamination of the environment have provided the government commission, union, republic, and oblast organs, and many ministries and departments with a great deal of information needed for decisionmaking since the very first days following the accident; after the information has been declassified, it is published in its entirety in the scientific and mass press (several articles were even published in 1986-1988).

Unfortunately, not everyone is interested in the results of even general studies. When, for example, the government commission for the elimination of the after-effects of the Chernobyl accident offered to distribute the book

"Chernobyl: radioaktivnoye zagryazneniye prirodnykh sred," which had just been published by Gidrometeoizdat (the book contains all of the scientific data collected in the last four years and many operational summaries), the UkSSR requested 30 copies of the book and the BSSR requested only 20 (!).

In conclusion, I want to say something about forecasts.

It is obvious that the pollution in the Chernobyl AES zone will be constant and protracted. After all, it is caused by long-lived radionuclides. In the "isolation" zone (the 30-km zone), for example, the pollution will depend on the half-life of plutonium-239 (24,000 years). Although the plutonium particles are now bonded more closely with the soil and there is less probability of wind dispersion, the area will remain an isolation zone until people are able to physically remove the soil layer containing the plutonium. As for the territory polluted by strontium-90 and cesium-137, the situation here would seem to depend on the half-life of these radionuclides (28-30 years), but measurements have indicated that the "effective" pollution of locations by, for example, cesium (including its accessibility to vegetation) will decrease as physico-chemical and biological mechanisms decay, because of its bonding with the soil, by half within, according to different estimates, 7-10 years or 10-15 years (land reclamation and decontamination operations could accelerate the process somewhat). The strength of the dosage will decrease even with the same density of cesium contamination as the cesium sinks (or migrates) into the soil (to a depth of 20-30 centimeters or more).

Therefore, measurements indicate the stabilization of radiation conditions in the zone affected by the "Chernobyl" radioactivity, and even a slight reduction in the effects of radionuclides on the human being and other living organisms, but do not indicate safe conditions.

Obviously, we must be prepared to wage an extremely lengthy struggle—for decades—before people can live and work safely in the regions affected severely by the "Chernobyl" radiation (outside the isolation zone).

#### **Chernobyl Clean-Up Progress Reviewed; Health Problems Noted**

*91WN0451A Moscow IZVESTIYA in Russian  
26 Apr 91 Union Edition p 8*

[Article by IZVESTIYA correspondent A. Illesh (Chernobyl-Paris): "On the Outside and the Inside of the Sarcophagus—Five Years After the Chernobyl Catastrophe"]

[Text] ...From a conversation with a colleague: "Listen, people I know—Kievites—have telephoned and said: something has happened with the sarcophagus. Either the roof has collapsed or a crack has run across the whole building. How dangerous is this for people?"

**The France-Press Agency:** "50-year old Vladimir Cherenousenko, who supervised the specialists who were working in the Chernobyl AES [Nuclear Electric Power Station] area right after the explosion, declared in an interview with British Television that the number of victims of the Chernobyl catastrophe was not 31 people, as was asserted in the official documents, but from 7,000 to 10,000. And he himself was gravely ill, and he had from two to four years left to live...."

Yes, the world is now observing the fifth "anniversary" of that horrible night, when the Chernobyl Power Station's fourth power unit, which had exploded, not only upset our notions about what the "peaceful atom" can do but also made it possible for this "peaceful atom" to enter into just about every home. In any event—into the lives of millions of people. The greatest catastrophe of the 20th Century will not retire into the shadows with the years. The echo of those events resounds painfully today. I began this item with two citations. And both of them, with all their absurdity, I am convinced, will be perceived by many as absolutely genuine facts. For it so happened that any official information about the Chernobyl realities has been subjected to critical interpretation and rejected by most people. And so what emanates from below—from the human victims—is terrible, unverified, and so easily accepted as the truth.

Who is guilty here? How to force the nuclear agencies and the military to be open and sincere? How to smooth out the mindless nuclear allergy?

But before the spring of 1986 we did not have any relationships at all between public opinion and nuclear power. In the USSR there was only the official point of view: nuclear power is good, it is progressive. It means warmth and light, it is a protector of the environment....In brief, the wonder of the 20th Century! And therefore the overwhelming majority of us did not know anything about the problems of this branch of science and production: secrecy reigned here.

The question has risen anew—why? The answer here is simple: nuclear power in the USSR is the child of the military-industrial complex. And so everything that is connected with matters military is a special secret.

The explosion at Chernobyl became the extremely belated start of mutual relationships between society and those who participated in nuclear power. Here, on the one hand, all the resistance to change of the state structure and neglect of the concrete person, his interests, his health and finally, his life, was observed. And, as

a result, we now have hundreds of thousands of people who have passed through the zone, and tens of thousands who have been resettled from dangerous places—and whose fates and problems have engendered new problems.

After the explosion the nuclear-power workers began to express themselves, having let the opportunity slip by, during the period of relatively peaceful development of nuclear power, to tell the truth about themselves and their activity, and to persuade people to develop the branch. Thereby, not only was time lost, but also the main thing—trust in scientists and specialists. Today they are in a most unenviable position: in the position of justifying their actions.

The development of a powerful green movement against this trying background in a half-starved and not very competent country led to its opportunistic use. The bulk of the newly appearing leaders, as well as the party and soviet structures, in order to acquire popularity in the difficult years of perestroika, played up to the people, adroitly playing the "Chernobyl" card. Thus from above and from below, through the press and meetings, and official reports and official denials, a most insidious illness—radiophobia—was fed.

But whatever the data—sensational or not very much so—that have surfaced today in the press or at meetings, at sessions of the Supreme Soviet or social movements, it is naively assumed that we shall be able, without scientists, to bring complete clarity to the Chernobyl drama itself or to try to solve (even by a majority of qualified voters) any of the nuclear problems. Including the problem of the sarcophagus.

Because of my profession, I was brought—I was inside the "Cover" facility, as the specialists call the sarcophagus, and I went from the lowest level to the very top. In hazardous places I dashed, in some places almost on all fours along poured concrete, and then along shrinking corridors...But to be divided nowadays by some emotions alone is naive, in my view. And it should be said that the Soviet public's complete distrust of Soviet physicists was in contrast with the extremely interested attention with which their reports were heard for a couple of days in Paris by 540 of the greatest scientists and practical workers from Europe, Asia, and both the Americas. The data that our side presented on the contamination by cesium spots are shown in the graphic. And the tables were the result of analytical research of the effect of radiation on the health of those whom the catastrophe affected directly.



The figure shows the areas contaminated by cesium. The places are those where the background exceeds 15 curies per square kilometer.

Key:

1. Belorussia.
2. Russia.
3. Kaluga.
4. Minsk.
5. Roslavl.
6. Mogilev.
7. Bobruysk.
8. Bryansk.
9. Gomel.
10. Chernigov.

11. Kursk.
12. Chernobyl.
13. Rovno.
14. Kiev.
15. Zhitomir.
16. Vinnitsa.
17. Poltava.
18. Uman.
19. Kirovograd.
20. Ukraine.

**Mortality Rates\* by Age of the Population of the USSR, RSFSR, UkSSR, BSSR, and U.S. for 1987**

Age	Sex	USSR	RSFSR	UkSSR	BSSR	U.S.
<b>Circulatory system disease</b>						
25-34	M	31.9	33.6	28.4	35.1	14.5
	F	12.2	10.0	10.1	10.5	8.4
35-44		135.9	143.1	123.5	151.9	65.4
	F	39.0	35.6	36.2	39.1	25.0
45-54	M	417.1	445.3	380.5	433.9	245.5
	F	146.2	141.7	136.5	142.7	93.5
55-64	M	1,128.5	1,193.0	1,071.8	1,047.9	691.6
	F	545.5	541.0	549.2	525.0	300.3
65-74	M	3,177.4	3,304.4	3,193.4	3,069.0	1,668.0
	F	2,012.1	1,196.4	2,109.0	1,939.9	895.7
<b>Malignant neoplasms</b>						
25-34	M	17.8	17.2	19.9	17.8	12.1
	F	19.4	19.3	22.0	18.7	12.7
35-44	M	71.8	73.9	80.4	75.3	39.1
	F	60.3	59.6	63.9	60.0	47.8
45-54	M	287.7	312.7	302.4	304.1	169.1
	F	153.7	155.9	159.0	144.1	159.7
55-64		769.5	841.6	702.9	528.4	374.6
	F	324.9	334.1	321.6	308.4	
65-74	M	1,269.6	1,409.0	1,196.4	1,072.9	1,084.0
	F	547.1	582.3	514.2	497.2	652.5

\*The number of deaths per 100,000 people of the population of the corresponding sex and age group.

It is important to add to this an important "detail": even the best-informed scientists and specialists cannot give specific figures for radiation exposure (and perhaps, even deaths) among the military. Army ranks have never granted such data to the public during these five years. And, as far as I recall, in the spring and summer of 1988 soldiers could be found in the most dangerous places: both at the AES industrial site and on the roof of the third power unit, and....(The author.)

Actually, one of the most controversial questions of today is the fate of the sarcophagus. One is the fact that the complete area of its opening—about one and a half thousand 1,500 square meters—can cause shock. But we shall try not to faint, and to hear out the thoughts of the scientists about the fate of this actually unique structure, in which is "preserved" 96 percent of the nuclear fuel that was in the fourth power unit by the night of 26 April 1986. And this is about 180 tons (for uranium), 400 kilograms of plutonium-239, 170 kilograms of plutonium-240, and a mass of transuranic elements....Almost 70 percent of the radionuclides of cesium remained in the block....

Is radioactive dust being discharged from the sarcophagus? Questions about this (and not only these questions but also statements: the facility continues to pollute the environment strongly!) are heard frequently. In point of fact, discharges from the sarcophagus are being followed carefully and by the most varied methods. Exactly how? First, air samplers are operating continuously along the four sides close to its walls. The activity of the filters is measured periodically and the content of radioactive

aerosols is determined. Second, purity of the air coming from a pipe that is common for the third and fourth power units is being monitored constantly. Finally, the specialists periodically go to the sarcophagus's roof and install plotting boards at the opening (and the complete area of its opening, I repeat, varies from 1,000 to 1,500 square meters). Dust issuing from the facility settles on them. Its activity is measured.

What does the aggregate of this research indicate? The sarcophagus, the scientists assert, practically does not affect air pollution in the area of the station. This is all the more so for Chernobyl or Kiev. The discharge of radioactivity (primarily cesium-137) has become entirely insignificant (less than for an operating unit by several hundredfold), since, at the start of 1990, a powerful dust-suppression device began to operate under the facility's roof. But however much you assure people with such data, the question about the ultimate fate of the "cover" will not go away.

And so, can the existing sarcophagus remain in peace until that time for which it was designed, that is, for



another 20 years? Scientists from the Institute imeni Kurchatov are convinced that this is risky! With the years, the fuel-containing mass that is inside the sarcophagus acquires ever increasing mobile forms—the lava is destroyed, forming basically a fuel dust, and partially also soluble compounds. The potential danger of dust discharge through cracks and the entrainment of radioactivity with water which gets through these same cracks within the building and into the external environment is increased....Second, the destruction of inner constructional structure under the influence of natural reactions (again, because of the incompleteness of sealing of the structure) will increase with time. Well, and the reinforcement of an enormous facility 60 meters high will be increasingly expensive, both in the financial as well as in the dosage "expenditures" sense. Third, we shall be frank—the lack of tightness of the sarcophagus's seal will increase with the years....

And so, the degree of risk is increasing. When can the danger be considered real? In the designed 20 years? Alas, more rapidly—in seven to ten. And the more rapidly the increase in danger becomes, the better.

Now about what fate the specialists propose for the sarcophagus. As the basic option, further sealing of the facility—the erection of a sarcophagus-2—is being proposed. Its erection will, on the one hand, enable the external environment to be fenced off, and, on the other, leave open the possibility of access to the accumulation of fuel, and, in the future, of sorting out the radioactive materials.

How possible is such a sorting out? After the accident at Three-Mile Island, the destroyed fuel remained inside the sealed envelope. Having made use of this, the Americans sorted it out under water by means of a special robot. This occupied more than 10 years and cost about a billion dollars. The Chernobyl accident was a "thing" of much greater scale. Moreover, it is impossible to fill the destroyed power unit with water. And there are no robots ready to help man in these ruins....And if it still is planned to sort out the sarcophagus in five-10 years, we must, simultaneously with sealing of the existing structure, begin actively to develop methods and means for this sorting itself.

And there are still original ideas. For example, if sorting out cannot be done under water, then the destroyed premises can be filled with special lightweight and rapidly hardening components, "to bind" the dangerous dust with them. And then we can dismantle the fourth power unit, which would be in a sort of "solid solution." But the latter are not realistic plans, more likely they are ideas for discussion. Scientists consider that the problem of the sarcophagus cannot be solved without the closest collaboration of various specialists both in this country and abroad.

It turns out that the specialists are calling their colleagues for collaboration. And the most painful and severe of post-Chernobyl problems is precisely that with which I

began my article: the problem of the mutual relationship of public opinion and the professionals. The latter have already begun to understand—and I am a testimonial to it—that without a favorable public climate the development of any kind of nuclear power is entirely impossible. So they are trying—both the theoreticians and the designers—to take steps to meet us. To a great extent the steps taken are still timid, and not by far are all of them being taken. But it is obvious: today a coming together is necessary—just so we will be able to convert the emotionally and stressful conflict into a discussion of our common present and future. Otherwise the post-Chernobyl syndrome will never depart.

### Ukrainian Health Minister on Chernobyl Issues

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25 Apr 91 pp 1-2

[Interview with Yuriy Prokofyevich Spizhenko, UkSSR Minister of Public Health, by TRUD UkSSR correspondent S. Prokopchuk: "There Is No Prescription for Lies"]

[Text] Chernobyl: five years later.

It is striking but it is true—the country's broad public still does not know about the true causes of those two most powerful explosions on 26 April 1986 which threw the fourth power reactor of the Chernobyl AES [Nuclear Electric Power Station] into disorder.

They were the consequence of violations by the station's personnel of the station's operating procedures! Such was the official version right after the accident, for which a group of AES specialists were convicted and are serving their term of imprisonment. Or is there another version of the origins of the "catastrophe of the century": imperfection of the design, nonconformity of the design of RBMK-1000 type reactors to the requirements for safety of their operation? There are such conclusions. A year ago the USSR State Committee for Supervision of the Safe Conduct of Operations in Industry and Nuclear Power Engineering created a new commission for ascertaining the circumstances of the Chernobyl accident, and a number of specialists and independent scientists continue private research....

While USSR Minatomenergoprom, USSR Minzdrav [Ministry of Health], and USSR Goskomgidromet [State Committee for Hydrometeorology] are thinking about what dose of the truth about the Chernobyl catastrophe they will give to the people's court, the residents of a dozen oblasts of the Ukraine, Belorussia, and Russia uncompromisingly experience with their health the destructive force of both large and small doses of radiation.

Just what were their consequences for the people of the Ukraine?

TRUD's own special correspondent for the Ukrainian SSR S. Prokopchuk talks with the republic's Ministry of Public Health Yu.P. Spizhenko.

[Prokopchuk] Yuriy Prokofyevich, I have been told that yesterday you visited Chernobyl again. What brought you there this time?

[Spizhenko] I went to a meeting with very interesting people, genetic scientists—the Gostev family. They are former staff workers of the Nikitin Botanical Garden. Right after the Chernobyl accident they left their apartment at Yalta and transferred to the 30-kilometer zone. Right now Aleksey Alekseyevich and Yelena Viktorovna and their six-year old son are living in one of the former preventive-medicine clinics, and they have an excellent laboratory. I went to them with a single purpose: to become acquainted with the results of their studies of the effect of small doses of radiation on living organisms.

They work basically with plants, but much data can be extrapolated to the chromosomes of the human cell. And these data are extremely revolutionary and extraordinarily urgent for the physicians of those regions that were subjected to radiation contamination.

[Prokopchuk] And what was revolutionary about them?

[Spizhenko] Klokhitsin is used in research throughout the whole world. This is a chemical substance which greatly deforms both the chromosome itself and living tissue in experiments. The Gostevs, using their own preparation, have got extremely persuasive data about the significant influence of small doses of radiation on plants. We already had this point of view (the International Atomic Energy Agency still actively supports it): small doses of radiation either have no influence at all, or, if they do, then it is extremely favorable on the living organism.

The Gostevs have done a large amount of scientific work, but until now they have published only in the West. The Pripyat NPO [Science and Production Association], like Minatomenergo [Ministry of Nuclear Power Generation], apparently would not like it very much if these discoveries became the property of a broad circle of specialists and scientists.

[Prokopchuk] Is it possible today to single out the main illnesses that have either become aggravated or more active since the Chernobyl tragedy?

[Spizhenko] Nowadays we can unambiguously speak about a large number of illnesses that are directly connected with radioactive irradiation. Above all, illnesses of the “eliminators” or of the populace that survived within zones of strict monitoring. In speaking about the residents, these are primarily children. They suffered worst of all. First, the number of cases of cancer of the thyroid gland in those who received a powerful iodine contact. Last year 22 cases of the cancer in children were recorded in the Ukraine. Prior to 1986 such cases were isolated.

The pathology of women’s pregnancy has been progressing greatly. Late toxicoses of pregnancy and premature births, and increasingly frequent miscarriages.... Finally, illnesses of the blood.

In speaking about the “eliminators”—those who worked for a long time directly in eliminating the consequences of the reactor’s explosions—at the AES’s industrial site, or within the 30-kilometer zone and “took” more than 25 roentgens, cardiac illnesses have increased in frequency among them.

[Prokopchuk] Based on these consequences, is it not most likely that an underestimating of the standards of the dosage limits of irradiation and of the criteria for survival on contaminated land that USSR Minzdrav [Ministry of Public Health] set right after the accident could not help but be telling?

[Spizhenko] This is actually so. Right now the International Commission on Radiation Protection has reviewed the standards. Previously the criterion for evacuating a population was 30 ber [roentgen equivalent, man] and now it is 5. If in 1986-1987 we had been guided by precisely these limits, then, of course, we would have avoided much harm. We then would have removed not 92,000 people but 250,000-300 000 people. And five years later, as is being done now, after people had already received a substantial dosage contact with iodine, cesium, strontium and plutonium....

[Prokopchuk] How is the Comprehensive Program (the medical aspects) of Research on the Consequences of the Accident at the Chernobyl AES, which was adopted in October 1986 by the USSR Council of Ministers, being carried out?

[Spizhenko] Its fate has been somewhat dramatic. Practically all the Ukraine’s scientific-research institutes have been included in implementation of the program. But not one ruble has been allocated for it. Do what you want!

It is not surprising that a major portion of the institutes have been overloaded by the program. Nevertheless, much work—based mainly on enthusiasm and to the detriment of other research—has been carried out by the Otorhinolaryngology Institute, the Institute of Pediatrics, Obstetrics, and Gynecology, the Kiev Medical Institute, and a number of NIIs [scientific-research institutes]. During this period, the Ukraine’s scientists developed and issued more than 30 recommendations for practical public-health measures for a radiation environment.

Today the Ukrainian Supreme Soviet has worked out and adopted a new republic program. Under it, firm financing in both rubles and foreign currency have been incorporated into the program. But there is practically no foreign currency. It is unrealistic to untie the tangle of medical problems which the accident has brought us without modern apparatus and equipment and the newest medicines.

[Prokopchuk] Where are you expecting foreign currency from?

[Spizhenko] We are for the present completely dependent upon Union organs, and we are waiting for it from the Center. Since almost all the foreign currency the republic has earned is in Moscow. If the Ukraine will get actual independence, then it, of course, will solve this program itself. But I want to say that the Ukraine is not in a position, either by itself or as a member of the Union, to cope with the results of the Chernobyl catastrophe. A lone person cannot handle such misfortune by himself. International collaboration is necessary in all areas. And we are hoping for this.

[Prokopchuk] Are the hopes justified?

[Spizhenko] We have many contacts with scientists of the U.S., France, and Germany. Right now seven scientists from the U.S. in Kiev are engaged in a study of the effects of radiation on children. These are joint operations, but for obstetrics and gynecology and for genetics, Ukrainian medical personnel are dealing with the U.S. National Institute of Public Health.

[Prokopchuk] I would like to return to history. On 7 May 1986 Vice-President of the USSR AMN [Academy of Medical Sciences] L. Ilin wrote in a reporting memorandum to the Ukrainian leadership: "An analysis of the radiation environment in the city of Kiev testifies to an absence at present of indications for evacuating the population, particularly of children, and in other regions...." And the leading scientist in this area of radiation protection said this, this in those days when the dosage load on the thyroid glands of children who had been running about the city's springtime streets and squares exceeded the permissible levels by hundreds of times!

[Spizhenko] Yes, a lie and a half-truth, the Center's informational story and the supersecretiveness about the true radiation situation outside the 30-kilometer zone did their job—about 150,000 residents of the Ukraine received radiation doses of the thyroid gland that exceeded the permissible. And 5,000 children and 7,000 adults received more than 200 rads on their thyroids, which under current norms exceeds the permissible limits 30-fold to 40-fold.

Today the capital's Institute of Biophysics of the USSR AMN has been compelled to recognize the mutual relationship of the accident with the spread of thyroid cancer, but it still "does not see" the connections of that massive pathology of the blood that is being observed today with the radiation.

[Prokopchuk] Again the desire to smooth over, to "prove" their prognoses expressed five-years ago. That, they say, the catastrophe was not as terrible as various reactionaries and ignoramus about science made out, and that no appreciable kind of harm to the health of the populations of the Ukraine and Belorussia, and even

more so of Russia, is expected in the next 20 years....I have several times happened to hear such placating talk by Academician L. Ilin.

[Spizhenko] I think that not all the critical shots need to be aimed just at the Institute of Biophysics. It is worthless now to seek out those guilty for the fact that hundreds of thousands of people happened to be irradiated, when it is more important to avert something that is worse. Here is a specific case for you. Ten kilometers from the Chernobyl AES, on the shore meadows of the Pripyat, lies an enormous strontium spot—more than 10,000 curies. In January of this year only about 50 curies of this spot fell into Pripyat and Dnepr water, but it right away changed its quality by an order of magnitude. And what will happen if flooding occurs, and the Pripyat's waters lap over this spot?! Can it be possible to forget that 38 million people drink Dnepr water? Nevertheless, for five years the problem of guaranteed localization of the spot has not been resolved. Either by means of a dam, or an embankment....

[Prokopchuk] More than 600,000 people took part in accident operations in the 30-kilometer zone of the Chernobyl AES. But only about 100,000 of them—scientists and nuclear workers and military personnel—have dosage records. Half a million "eliminators," especially those who were brought in under the auspices of military commissariats and other agencies, have never known to this day how much radionuclide they actually "took."

[Spizhenko] This is one of the most complicated and still poorly resolved medical problems of Chernobyl. In the first months of the accident, there was in practice no strict dosimetric monitoring of those who worked on erection of the "sarcophagus," cleaning and deactivating the station's "glowing" industrial site and other facilities of the zone, and who in essence closed the radioactive opening of the fourth power unit. Not all of them had accumulator dosimeters, and if they did have them, the true dose which their body had absorbed was not always known. Thousands of them do not know even to this day the extent of the irradiation they received and what to expect tomorrow. And they received, according to our data, more than 25 roentgens, and 30 percent of them may develop various types of malignant neoplasms in the next 15-20 years.

In our republic's registry alone there are 120,000 "eliminators." I personally appealed to Minatomenergo, to the country's former and current prime ministers, and to the USSR Ministry of Public Health: tell us the precise doses that the "eliminators" from the Ukraine received. But no one is saying anything.

Unfortunately, not by far have all the "eliminators" been found. For at that time people were being sent into the 30-kilometer zone urgently, in haste, at times without the appropriate equipment, papers, and travel allowances. Many of them lost their papers in the confusion and

panic of the first days. Taking advantage of the opportunity, I ask everyone who participated in eliminating the consequences of the catastrophe within the 30-kilometer zone and did not get listed by public-health organs, to apply to their district polyclinics with documents or testimonial indicators, in order that they may be entered on the register and be constantly observed by physicians.

[Prokopchuk] Apparently, many of them can count also on appropriate privileges?

[Spizhenko] Of course. A couple of days ago the Ukraine's Supreme Soviet adopted, as you well know, a whole package of laws on Chernobyl. About the legal standing of the area that was subjected to radioactive contamination, about the status and social protection of the suffering citizens.... These are the most humane laws that the republic's Supreme Soviet has ever adopted. And they are expensive.

Just for our Minzdrav alone, R2.5 billion and hundreds of millions of foreign currency are needed. Otherwise we shall not be able to provide for dosimetry, for management of the registry, or for comprehensive diagnostics and treatment.

[Prokopchuk] At a citywide trade-union meeting not long ago its participants advanced a demand that Kiev be given the status of a city that had suffered from the Chernobyl catastrophe. How do you feel about this personally?

[Spizhenko] Positively. First, the radiation situation is not as harmless as some of the Moscow scientists try to prove. The average of cesium contamination, for example, is 1.6 curies per square kilometer. There are places that are much more contaminated. Of course Kievites do not raise agricultural produce, nor do they milk cows, but the children do play in the squares and parks and breathe dust. And adults, too.... Moreover, the city is one of a dozen industrial centers with an extremely unfavorable ecological situation. Discharges of industrial enterprises that are dangerous for health are great.

Calculations indicate that if the city is given that status, then R7 billion must be allocated for it from the republic or the Union budget. For compensation and privileges, for free treatment and medication, for pensions and disablement....

[Prokopchuk] At the last plenum of the Ukrainian Communist Party Central Committee it was said that "in the solution of the whole set of problems associated with Chernobyl," your ministry and you personally are lacking the main thing—systematicness, proper quality, active support, and attention to these problems. Do you agree with this criticism?

[Spizhenko] For me it was unexpected that the republic's Ministry of Health found out about the plenum's agenda (and the problem of urgent measures for eliminating the

consequences of the Chernobyl catastrophe was also examined) only at the plenum itself, hearing about the criticism you cited from the mouth of S. Gurenko, First Secretary of the Central Committee. The ministry which, naturally, plays not the least role in eliminating the accident's consequences not only was not brought into the preparations for the plenum but was not even given notice that it should be ready for such a question. But, similarly, they did not want someone to come out with a supplementary report and say what many would not want to hear against them.

[Prokopchuk] Nevertheless, they gave you the floor.

[Spizhenko] I said that the problems of Chernobyl cannot be the subject of political chatter, that they should be solved by professionals, and I cited a number of cases that indicated the opposite. For example, about the fact that the production of the Beta radiometer, with a sensitivity one-tenth that of Western models, had been blessed in a bypassing of Minzdrav and the All-Union Radiological Center. And R2 million were allocated for the introduction of this technical "wonder." Again, group interests took precedence over common sense.

I said another thing that also, apparently, did not please the "first": we have something today for diagnosing those who are suffering but nothing to actually treat them with.

[Prokopchuk] And lastly: where will the International Scientific-Research Radiation Center, for the erection of which the World Health Organization plans to allocate \$20 million, be built?

[Spizhenko] This is nonsense, and just that! They want to erect it at Obninsk, near Moscow, and not on Ukrainian or Belorussian lands, where there is a surplus of live material for various research. Again, group interests hold sway over the interests of all mankind. I shall not try to get something for myself. Let this center be built in Gomel or Bryansk. But we, the ministries of public health of the Ukraine and Belorussia and the USSR Ministry of Health were told unequivocally: if you insist on having it your own way, you will not receive any money at all....

Today L. Kravchuk, Chairman of the Ukraine's Supreme Soviet, and V. Fokin, Chairman of the republic's Council of Ministers, have been occupied with this question personally and they have joined in negotiations with the Union leadership. I hope that common sense will triumph.

### **Chernobyl Clean-Up Mismanaged**

914E0103A Kiev *SILSKI VISTI* in Ukrainian  
29 May 91 p 1

[Article by N. Lytvynenko: "Under the Curtain of Secrecy: Radioactive Contamination Is Spreading in the 30-Kilometer Zone"]



[Text] Participants in the international seminar "Euro-Chernobyl-2," which ended recently in Kiev, were invited on a trip to the ChAES [Chernobyl Nuclear Electric Power Plant]. "There you will be served a dinner of the cleanest foods in the world," the organizers of the seminar assured foreigners. "Nuclear scientists know more about this than anyone else."

I do not doubt that nuclear scientists know how to protect themselves from radiation and that our own Ministry of Atomic Energy and Industry is doing what it can to ensure its people more or less clean food and special clothing and equipment. But how well are other residents of the Ukraine protected from their experiments?

Even now, perhaps, a bread wagon drives throughout Poliskyy Rayon of Kiev Oblast and delivers to the villages up to 400 microroentgens per hour of radiation along with the bread. One assumes that it "picked them up" during a period of work in the strict-control zone. But perhaps the wagon was taken out from the 30-km zone. After all, close to three thousand very contaminated vehicles and pieces of equipment are in the zone without any protection or even a fence. Over the last five years anyone who wanted could enrich himself with spare parts and other articles. Especially because transportation often goes beyond the bounds of the zone without preliminary inspection with a dosimeter. Contaminated equipment and materials are carried out not only on roads but by means of the Pripyat: no one has been protecting and monitoring the border of the 30-km zone with an eye to the river. This year alone a great deal of reinforced concrete products, lumber, and metal goods contaminated by radiation have been sent from Chernobyl to Vyshgorod.

These facts were brought to the attention of the collegium of the republic's procuracy by O.M. Kolinko, a department head who has been verifying observance of environmental laws by the Pripyat Scientific Production Association [NPO]. I listened to Olga Mykhaylivna and recalled the report of M.A. Hordeyev, who took part in the clean-up of the disaster at the ChAES in 1986. He reported how young servicemen were forced to wash off equipment. According to all the rules it should have been sent straight off to be buried, but it was sent... to Sverdlovsk where it is perhaps being put to use even today. At the time this seemed to me to be an exaggeration. But now it turns out that it was the truth. Is it not interesting that it is the employees of the Pripyat NPO, which was created precisely to protect us from such phenomena, who are now speaking up?

M.O. Sedov, general director of the Pripyat NPO, has not denied it. "When I first saw what condition the disposal sites of the radioactive substances were in, my hair stood on end. In the zone everything was being done hastily," he said at the collegium of the Ukrainian SSR Procuracy.

As a result, five years after the disaster has too little been done to bring order to the zone? Even today one can find

piles of uncollected radioactive trash around which people live. A direct threat of contamination of drinking water has arisen. Radioactive particles from Chernobyl are not only settling to the bottom of the Dnepr but are being carried by it to the Black Sea. And they may appear in ground water.

The Pidlisne and Rudyy Lis disposal sites of the radioactively-contaminated wastes may play a substantial role in this. In the latter site there is 500,000 cubic meters of contaminated wood. It seems that the tragedy of Chernobyl did not teach anything to those who constructed the disposal sites. Pidlisne is set in a ravine near the filtration fields of the purification structures of the nuclear station. Deep cracks have already appeared in its walls, as a result of which its use has been halted. If one takes into account the fact that the purification structures are already overburdened and flooding the disposal site with deadly contamination, then one can imagine what kind of "cocktail" may form in the near future in the underground water-bearing strata. Rudyy Lis is no less a threat. It consists of unmodified trenches and earthen pits. Only three bore-holes have been drilled for monitoring the 400 hectares of the disposal site, which cannot give a full picture of the spread of radioactive particles.

It turns out that only a small portion of the monitor bore-holes in the zone belong to the Pripyat NPO. Practically no one keeps an eye on the others, which are in the majority. The administration that carries out monitoring with dosimeters performs such monitoring only at individual facilities, which does not permit one to monitor the standing and condition of underground waters as a whole. According to the specialists, one can expect substantial contamination of underground waters with strontium and cesium in ten or more instances.

I heard these disturbing facts cited at the collegium of the Ukrainian SSR Procuracy, and I was surprised at the calm with which employees of the Pripyat NPO received these just accusations, especially its director, M.O. Sedov. It was as though the subject was not deadly roentgens but rather some kind of common petty accounts. And, as always, "excuses" were found. For example, Mykhaylo Oleksandrovych reprimanded the Ukrainian SSR State Committee for Environmental Protection for supposedly prohibiting the use of an installation for decontamination of contaminated equipment. He blamed the scholars who still have not come to a unified position concerning the future of the Pripyat basin, where the majority of the radioactive particles have accumulated and may, during a flood, be washed into the Dnepr. Thus, the scholars have been holding things up. But so long as the thunder has not been heard or, in other words, so long as a threatening situation did not arise in January of this year, when radioactive contamination was found in the water, the administration of the Pripyat NPO was in no hurry either. Perhaps they expected that it would pass. Even though protecting people from possible catastrophes in the zone is its direct



obligation. Particularly when the state, according to the testimony of that same Sedov, is being liberal with its money for Pripjat.

And how is this money being used for scientific research and for work to protect the population of the Ukraine from the devastating action of the radiation? The Ministry of Finance revealed that 13 million rubles [R] allotted to Pripjat for environmental purposes was not used for those goals. It is not surprising that there is not enough money even to construct a dam in the Pripjat basin which could serve as a defense against the travel of radioactive particles. On the other hand, there was more than enough money to lavishly entertain foreign delegations and encourage "necessary" people, during the election campaign for example. In the city Pripjat maintains a swimming pool staff at the same cost as a decontamination shop. At the same time that decontamination of contaminated equipment and lodgings is being conducted, such instances as this arise: demands to clean up the remnants of radioactive substances near the village of Rudnya Illinetska, where unauthorized settlers live with children, and the village of Rozsokha still have not been carried out. On the other hand, the book-keeping is in complete order: over the last year more than 1,300 lodgings were designated demolished and contained, although it turned out that the necessary funds for their decontamination were not even allocated.

The 30-km zone has seen its share of exaggeration of official facts and window-dressing. Instead of concerning themselves in proper fashion with cleaning it up and protecting the people, the leaders of Pripjat have been buying color televisions and video equipment from cooperatives at inflated prices. When an inspection was made, a portion of that equipment could not be found. The inspectors were told that the expensive and coveted equipment had been written off as heavily contaminated with radioactivity. But the Procuracy did not believe that the equipment was buried in one of the disposal sites and has brought criminal charges. At the same time, the Procuracy is interested in learning where money allotted for cleaning up after the disaster and for protecting the environment went.

It turns out that vigorous economic activity has developed in the 30-km zone. In the settlement of Kupovate they have created a subsidiary farm for growing pigs and livestock. Some R600,000 have been allotted for its expansion and reconstruction this year. There they grow many minks, polar foxes, and ferrets. One wonders where livestock production goes from the zone and who consumes it. After all, the level of radiation on the livestock farm in Kupovate exceeds the norm by a factor of 2.5-6. And the fish that are used to feed the animals are caught in the area of the reactor near the sarcophagus.

The chief cause of all these disgraces is the lack of control of the organizations to which the Union Government has handed over the 30-km zone and the secrecy with which it was shrouded owing to its special status. After

all, two years ago even employees of the Republic Procuracy were not allowed there. An absence of laws in accordance with which supervision by the procurator might have been performed has also contributed to this. Today supervision has become possible under the influence of the public and new, recently adopted laws concerning Chernobyl. On the other hand, it will not be complete so long as the zone remains outside the jurisdiction of the Ukraine. This question has been raised with the center more than once, but it still has not been resolved. The Ukrainian SSR Procuracy has issued an official warning to M.O. Sedov, the general director, indicated serious defects in the organization of procuracy supervision to V.S. Kalyuzhnyy, procurator of Kiev Oblast, and petitioned the Pripjat NPO and the USSR Ministry of Atomic Energy and Industry. But will this be enough to halt the spread of the radioactive threat throughout the Ukraine?

#### **Ukrainian Objections to IAEA Report on Chernobyl**

*LD1206191391 Kiev Radio Kiev International Service  
in Ukrainian 2200 GMT 11 Jun 91*

[Text] A briefing for Soviet and foreign journalists took place today at the press center of the Ukrainian Soviet Socialist Republic [SSR] Ministry of Foreign Affairs in Kiev. Our correspondent Tamara Kucherenko gives details:

[Kucherenko] Among the issues of current foreign political activity of the Ukrainian SSR, special place was assigned to the results of the Vienna conference on Chernobyl. I will remind you that a discussion of the report by the international consultative committee for the project, which was called "Radiological Consequences of the Chernobyl Atomic Station Breakdown—Assessment of Its Effect on Health of the Population and the Environment," took place at the International Atomic Energy Agency [IAEA] headquarters on 21-24 May of this year. Those taking part in the briefing talked about a number of serious drawbacks in the report by international experts, while highly appraising the work carried out by foreign specialists on the whole. It was noted that the Vienna conference cannot in any case be considered the final stage of work on studying the consequences of the Chernobyl Nuclear Electric Power Station breakdown. What do our foreign colleagues think about this? Danish journalist Martin Andersen, co-director of the Ukrainian branch of Greenpeace International, gives his view.

[Begin Andersen recording in English fading into Ukrainian translation] Our attitude to the IAEA report as a scientific work is very negative because their conclusions were based on the results of examination of only 1200 persons from three republics—Ukraine, Belorussia, and Russia. There were very few children among them. It is very difficult for me to explain how the results of such a small examination could supplant the examination of

the German Radiological Institute, which during many years had the opportunity to examine thousands of patients.

We know that 50-72 percent of the population that lives on the contaminated territories have complications with thyroid glands which was not reflected in the IAEA report at all. Besides, one of the IAEA's mistakes was the fact that they did not examine those who liquidated the breakdown and those evacuated from the contaminated territories, because, as IAEA officials stated, these people do not live in the contaminated territories at present and therefore can not be subject of the examination. [end recording]

[Kucherenko] The representative of the Ukrainian branch of Greenpeace International says that the report denies and conceals the real price of Chernobyl. The so-called independence of research by the international consultative group gives rise to great doubts. One forms an impression that the IAEA's research was controlled by representatives of the USSR Ministry of Atomic Power, people who really are guilty of the Chernobyl catastrophe. The final conclusion about the Chernobyl tragedy has to be made by time, but the speeches by those taking part in the briefing indicated once again the necessity to continue research and work further on the whole complex of problems of the Chernobyl catastrophe, especially the assessment and protection of the population's health and also forecasts carried out on a multilateral basis.

#### **Belorussians Criticize IAEA Chernobyl Conclusions**

*LD1206094491 Minsk Radio Minsk Network  
in Belorussian 0300 GMT 11 Jun 91*

[Text] Sitings of the permanent commissions on legislation and problems of the Chernobyl catastrophe took place at the Supreme Soviet of the republic. The people's deputies heard the report of the Belorussian Soviet Socialist Republic [BSSR] Academy of Sciences, the Ministry of Protection of Health, and the Foreign Ministry of Belorussia, representatives of which took part in the work of the International Consultative Committee on the Chernobyl project in Vienna this year.

The people's deputies expressed their dissatisfaction with the BSSR Ministry of Health Protection because of inaccurate information on the state of people's health who live in the area affected by the catastrophe. It negatively reflected on the results of the Vienna conference. Discrepancy between the appraisal of [word indistinct] of Belorussia and the IAEA on the results of [words indistinct] of the AES [nuclear electric power station] was obvious.

The commission concluded that it is necessary to prepare immediately a special scientific report on the subject matter of the international project, and to hand it over to the International Consultative Committee and

the IAEA Secretariat in order to change the attitude of the international scientific community to the problems of Chernobyl.

#### **Death Rate of Chernobyl Rescue Workers Rises**

*LD1006162391 Kiev Radio Kiev International Service  
in Ukrainian 1800 GMT 8 Jun 91*

[Text] According to the data released by the Dnepropetrovsk branch of the Chernobyl Association, 255 participants in the elimination of consequences at the Chernobyl Nuclear Electric Power Station have died so far. During the last half-year the death rate among these people has doubled.

In a press interview, Mykhaylo Rozvol, the branch's head, observed that the curve of mortality will continue rising. As before, these people, so-called liquidators, are left to face illness on their own. No comprehensive state program of caring for and treating them yet exists.

#### **Statistics on Chernobyl Radiation Deaths**

*PM1706091491 Moscow KRASNAYA ZVEZDA  
in Russian 13 Jun 91 First Edition p 4*

[USSR Health Ministry and Central Military Medical Directorate information in answer to reader's letter—first paragraph is reader's letter: "How Many Died of Radiation Sickness?"]

[Text] Is it known today how many people died of radiation sickness during the elimination of the consequences of the Chernobyl AES [nuclear electric power station] accident? [Signed] B. Onishchenko, Kiev.

In the course of overcoming the accident at the Chernobyl AES, 145 people contracted acute radiation sickness. Of these, 30 died.

At the end of last year, 275,614 people who took part in eliminating the accident's consequences were under the supervision of medical institutions of the USSR Health Ministry system. In 1990, in the Ukraine, Belorussia, and the RSFSR, 1,065 of these people died from various causes (accidents, poisoning, serious injuries, general illnesses). This corresponds to the structure of mortality among men aged 20-49 in the country as a whole.

This information was obtained from the USSR Health Ministry and Central Military Medical Directorate.

#### **Scientist Claims Chernobyl Reactor 'Contained a Bomb'**

*OW1706045291 Moscow INTERFAX in English  
1800 GMT 14 Jun 91*

[Following item transmitted via KYODO]

[Text] E. Sobotovich, a corresponding member of the Ukrainian Academy of Sciences, has told a joint session of national, Ukrainian, and Belorussian parliamentary

commissions in Kiev that "the Chernobyl plant's reactor actually contained a bomb of which the servicing personnel was totally oblivious."

He made the sensational statement after he established that a portion of nuclear fuel erupted during the explosion at the 4th power unit which had comprised uranium-235 enriched to a level of 60 percent or more, which is notably higher than the level of enrichment characteristic of uranium generally used at nuclear power stations. "When the control bars were removed from the active zone, the explosion became unavoidable," Mr. Sobotovich concluded.

It is still unclear how that kind of uranium got into the reactor. But considering the fact that even today the system of fuel input control is absent at most Soviet nuclear power plants, the danger of more accidents of this kind is very real, requiring only a minor flaw on the part of the fuel producers.

IF's [INTERFAX] correspondent reports that the Kiev conference accused the USSR Atomic Energy Ministry of "stubbornly ignoring" any efforts to establish the true reasons for the Chernobyl disaster.

#### **Authorities Draft Measures To Improve Moscow Environment**

*LD1306153191 Moscow TASS in English 1458 GMT  
13 Jun 91*

[Text] Moscow June 13 TASS—An extremely unfavourable ecological situation has developed in the Soviet capital and in adjacent areas. The life and health of millions of Muscovites and the future of the city itself hinges on whether efforts to improve it will succeed. The content of nitric oxide in the air of Moscow and its suburbs exceeds by four times the average level for the country and of hydrocarbon, ammonia and methylene oxide—by 50 percent. A total of 1.1 million tonnes of hazardous substances are discharged into the atmosphere—about 130 kilograms per each Muscovite.

Motor transport is the main source of the contamination of the city environment, accounting for 72 percent of all harmful emissions. Power-generating and chemical industry enterprises also add to air pollution. The state of water resources is no better: About a million tonnes of nitrogen compounds, petroleum products and heavy metals are dumped annually into Moscow rivers and water bodies.

The lack of coordination in ecologists' actions became a serious inhibitor to ameliorating the ecological situation in the city. Until recently, the large number of ecological programmes and instructions undercut the effectiveness of nature conservation measures. To rectify the situation, the Moscow City Nature Conservation Council has developed a blueprint of ecological measures for the region that evaluates the state of the environment and analyses the town-planning, economic and social aspects of nature conservation in the capital.

The committee has invited people's deputies, specialists and representatives of the public for a constructive discussion of these measures by sending the draft document to municipal authorities, nature conservation services and scientific centres. Mindful of their opinions, the scientific and technical council will formulate a comprehensive programme for improving the environment in Moscow.

#### **Moscow TV Airs New Ecological Program**

*LD0806170391*

[Editorial Report] Moscow Central Television First Program Network in Russian at 1200 GMT on 8 June replaces the scheduled "Television News Service" program with a new 19-minute ecological program entitled "Cross News".

The opening title sequence is accompanied by captions saying "Triad Ecological TV Company" and "TV News". This is followed by more captions saying "Cross News" in English and "Krest Novosti", meaning the same in Russian. The unidentified presenter explains the program change as follows:

"Hello, the first edition of a new news program called Cross News is on the air. The Triad TV Company, with its partners and sponsors, is beginning its ecological program. The need for this became apparent long ago. Ecological problems are now the main ones facing the world. They ignore state borders and national distinctions. In our programs we will try to create a kind of mosaic picture of ecological calamity in the world."

A brief preview is carried of the material to be shown in this edition, followed by the items themselves as follows.

1. Interview with L.P. Kaznachejev, director of the Research Institute of Clinical and Experimental Medicine of the Siberian Branch of the USSR Academy of Sciences, on the damage being done to the ozone layer. The presenter explains that since 1957, 7,000 rockets have been launched from Earth and each time a whole has been punched in the ozone layer. (1 min)

2. Interviews with a group of parents meeting in Moscow who have been subjected to excessive radiation at one time or another, for various reasons. Their children have been born with various deformities, which the camera dwells on. They are all suffering from leukemia. The parents blame incompetence and a conspiracy of silence for their children's sufferings. Close-ups of weeping mothers and children. Most of the parents want their children to be treated abroad, but this is impossible on cost grounds. (2 mins)

3. Feature on foreign tankers which have caused pollution at Novorossiysk by discharging their tanks in coastal waters. The fines imposed, in rubles, are very small. This is an open invitation for foreign ships to continue the

practice. Meanwhile, fish, algae, and crabs are dying. The sunken "Admiral Nakhimov" is also leaking oil. (2 mins)

4. Feature on "ecocide", as illustrated by firing of oil wells during Gulf war. The effects have been felt as far away as Siberia.

5. Feature on the destruction of cedar trees by the Soviet pencil industry. The felling of cedar has been banned by the Supreme Soviet since 1990. Now the Supreme Soviet is being accused of strangling the pencil industry. Members of the Supreme Soviet's Ecology Committee have been visiting Tomsk Oblast to investigate the situation. The pencil industry is accused of blackmail. No attempt is being made to process tailings. The Japanese do everything much better. All by-products are utilized and substitutes are found for wood in the construction industry. (1 min)

6. Feature on an attempt to build a tree belt right round the world, along the 44th parallel. Scenes of tree planting in Pyatigorsk and Toronto. (4 mins)

7. Data from the USSR Hydrometeorological Center on the discharge of harmful emissions into the environment during March and April. Astrakhan, Gubakh, Volzhsk, Krasnoyarsk, and Novodvinsk were the most polluted places. (4 mins)

### Scientists Want Leningrad Barrier Construction Stopped

LD0806035891 Moscow TASS International Service  
in Russian 1140 GMT 7 Jun 91

[By TASS correspondent Lev Frolov]

[Text] Leningrad, 7 Jun (TASS)—A bus route has connected Leningrad and the island of Kotlin, in the Gulf of Finland, where the town of Kronshtadt is situated. It looks like a minor event in the transport chronical which has aroused a wide public response. The route of the bus along the top of embankments and over bridges which are part of a dam, a complex of protective constructions which protect the city from floods.

A new eruption of emotions in relation to the continuation or the conservation of the 25 km dam, which is to withstand tidal waves from the Baltic Sea, was provoked by an open letter of a group of prominent Soviet scientists and public figures. They are vehemently in favor of a halt to the construction. They justify their arguments with the very unhappy sanitary situation that has occurred in the estuary of the Neva River and the role of the dam in an ecological catastrophe. Without refuting the positions of the authors of the letter, experts, nonetheless, are not inclined to jump to such unequivocal and categorical conclusions.

Mikhail Gubkin, deputy chairman of the executive committee of the city soviet, commenting on the existing situation in a conversation with a TASS correspondent,

reminded of the conclusion which an international commission had come to after it studied the ecological situation in the mouth of the Neva River last year: The harm caused to the water sphere during ten years of the construction of the dam is far less than the harm which is being inflicted by untreated waste waters of the industrial enterprises which are situated on the banks of the Neva, its tributaries, and of Lake Ladoga.

Gubkin unequivocally thinks that the problems of the construction of sewage treatment plants and recycling water supply systems should be dealt with first. The amount of work being carried out on the dam has been sharply reduced on the demand of the Leningrad Soviet.

### KGB 'In No Hurry' To Pursue Green Politicians' Attackers

PM1206102191 Moscow KOMSOMOLSKAYA  
PRAVDA in Russian 8 Jun 91 p 1

[SEVERO-ZAPAD news agency report: "Greens Against the Mafia"]

[Text] Leningrad—On the evening of 3 June an assault was committed against V. Gushchin, cochairman of the Russian Green Party. A gang of five kids who had been lying in wait for Gushchin by the entrance to the party's headquarters started beating him up right on the street. Vladimir's companion Sergey Belov, a nature conservation inspector, also came in for punishment—he received a mild concussion and internal bleeding. Gushchin has a fractured cheekbone and fractured ribs. Only ID documents, a nature conservation inspector's certificate, and a press card of the Green Party's OYKOS almanac were stolen.

It can be assumed that this incident is yet another warning to the Greens from the mafia, which is selling timber abroad illegally.

It is noteworthy that this is the first terrorist act in Leningrad against the leader of an officially registered alternative political party. The KGB is conducting an investigation into this case of assault and battery. However, it is in no hurry to fulfill its direct obligations.

### Leningrad Firm Offers Device To Save Fuel, Reduce Auto Emissions

91WN0469A Moscow TORGOVAYA GAZETA  
in Russian 18 May 91 p 3

[Report by TORGOVAYA GAZETA correspondent L. Raykova: "New Times: Business for Sale"]

[Text] A GAI [State Automobile Inspection] ecological detachment has begun work in Mordovia. The unusual militia tries to minimize emission of auto gases. I do not know how private drivers in Mordovia like this innovation, but the Leningrad Ekospektr Scientific Production Association openly rejoiced at this event. The reason is that a year ago Ekospektr launched production of an



automobile gasoline-natural gas unit that not only reduces the quantity of harmful emissions by half but also conserves 30 percent of the gasoline.

And this is how it works. The automobile starts on gasoline. Then the gasoline supply is cut off and natural gas "goes to work." The top speed on natural gas is 15 kilometers an hour. At speeds of 15-65 kilometers an hour, the motor operates on a gasoline-natural gas mixture. The fuel is blended in the carburetor and the driver is absolutely unaware of it. When the speed is more than 65 kilometers an hour, the engine changes to "gasoline" supply.

Many private drivers in Leningrad have found the new unit to their taste. For after the unit is installed in the vehicle, the association provides guaranteed technical service for a year. However, the commercial business soon ran out of room in one city. The inexpensive—only 560 rubles [R]—unit was readily adopted by private cab drivers. But the introduction of the new novelty did not find approval from the motor vehicle pools in the city. That is certainly not surprising, since ecological indicators of their work do not affect the financial condition of the automobile firms. Then Ekospektr sold the unit to other regions of the country. So, the association acquired eight subsidiary enterprises in only three months. But what is the secret of this demand?

"Essentially we sell a ready-made business," general director A. Berdichevskiy believes. "Along with the technical and authorization documents our new partner receives the monopoly right to the gasoline-natural gas system unit in a particular region. We also help get the business going. First our consultants go to the particular site. Along with the license Ekospektr sells 15-20 units right off, so that the work can begin without delay, and we help conclude contracts with manufacturing enterprises for delivery of the assembly components."

"It is very tender support in our harsh times. And for only R30,000. You know, even the commercial price of a Volga is now R260,000 and a Xerox machine costs from R100,000 to 200,000. What is the reason for such a low price for a ready-made business for an entrepreneur?"

"We uphold that price deliberately. There should be one owner of the gasoline-natural gas system. Improper use of it may easily ruin the business. And it looks very promising. We have received a proposal from the Czechs and French to sell the patent for it. We were advised to distribute the innovation throughout the country before signing a contract. We took a different path. We are selling it at a cheap price, but we retain the right of the principal firm. We continue working to improve its design. We monitor the technical embodiment of the idea. In addition to everything else, the subsidiary firms will pay us 10 percent of the value of the work they do for the first seven years. I think that this system of interrelations is not only mutually profitable, but also very

useful. It will not fall into the hands of the nonprofessional—that is one thing. When necessary the automobiles throughout the entire country can be modernized—that is the second. And demand for these applications, I guarantee, will rise sharply as soon as the Mordovian experience of the ecological militia crosses the republic's border."

**Additional information on buying the business can be obtained by telephone in Leningrad: 164-97-47 or 164-42-63.**

#### **Investigation of Lake Ladoga Nuclear Experiments Updated**

91WN0449B Moscow IZVESTIYA in Russian  
17 Apr 91 Union Edition p 8

[Article by O. Tarasov, Leningrad Oblast: "The 'Whale' With Radiation in the Hold"; first paragraph is source introduction]

[Text] In the fall of last year I published an article about a half-submerged destroyer located near the islands of the Western Archipelago in Lake Ladoga named "Kit" (Whale), which had radioactivity in its hold. At that time I did not guess that the old ship had a secret, which until recently was kept in the family. However, witnesses and participants from events of the early fifties responded to the article. As it turned out, large-scale experiments with radioactive substances were held in the vitally important area of Lake Ladoga, next door to Leningrad. These substances were dispersed in this locality by means of explosives in attempts to simulate nuclear explosions.

The stories of the witnesses had to be checked and clarified, of course, by the military agency which now coordinates the work to eliminate the consequences of the dangerous experiments at Lake Ladoga. It turns out that the nation's army archives do not have documents which disclose the methods or the qualitative and quantitative indicators of the experiments with special charges conducted on the islands.

And today's military specialists have to detect, so to speak, the details of those long-ago experiments by working in the immediate area with radiometers and dosimeters. The work has been going on for many months. They have gathered data and compiled maps of the contaminants. The results of the investigations must now be checked with veterans who participated in the tests and others who served at one time in the special purpose division.

They formed the division in the spring of '53. The Baltic Fleet allocated middle-sized and large launches. The division was based in one of the bays on the western shore of Lake Ladoga. They located the center of the test site on the island of Suri (now Kheynyasenma). They gave new names to all the previously Finnish islands of the archipelago because of the special secrecy of the work which was done here.



The Podvzhnyy, a destroyer, which was soon renamed the Kit (Whale), was the largest vessel in the sub-unit.

The testers were brought here by launch from the island of Suri. The strange appearance of these people in insulating, anti-gas suits, special footwear and gas masks at first puzzled the young sailors who serviced the test site.

The testers loaded the destroyer with measuring equipment and a "cover" charge—an inoffensive-appearing wooden box with handles. But the contents were terrible: explosives and a large container with a concentrated solution of radioisotopes. They transported the container in an outer lead container, and treated it with special care... They put experimental animals—dogs, rabbits and white mice—in the ship's quarters.

The sailors observed the explosion from under cover. A cloud arose over the ship and the islands, and then it quickly dispersed.

When ordered by the Kit, the launch returned to the very center of the radioactive hell. It took on board the testers and the equipment. They were breathing air which was poisoned with radiation. They did the work with no misgivings, not even guessing the risk they were being subjected to. Alas, protective gear was not issued to the sailors. After every explosion they brought the irradiated animals to a laboratory, which was located on the island of Malom-Makarinsari. The testers underwent personal decontamination on Suri-Kheynyasenma, where they lived and worked.

And on the Kit itself several such explosions were heard, on the deck in the superstructure and in the hold. (Later, it is possible, they put "contaminated" objects in the hold—they buried them there).

Today one can walk on the snow-covered deck of the Kit without misgivings. The specialists from the Leningrad Department of Radiation Monitoring and the Radium Institute who arrived with us are measuring the level of contamination. There are two places on the ship where the exposure dose of the penetrating radiation approaches 1,000 microroentgens per hour; the beta contamination in the superstructure and the hold are approximately 1,000 times above the natural background levels. This summer Navy specialists will raise the ship off the bottom and take it for burial in accordance with existing standards.

They also held explosions on the Island of Suri. It is difficult to explain this choice; after all, it is only a half-hour walk around the island from here to the headquarters of the test site.

One explosion took place on the deck of another experimental ship, the Morskoy Okhotnik (Marine Hunter), which they brought here, into the bay. Today its hull is still turning black, along with a half-destroyed pier. Later the explosions took place at a special site. Clouds of radioactive dust rose above the island, settling on the

trees, rocks and surface of the lake. Animals invariably participated in the experiments. And, unfortunately, sailors invariably worked in the danger zone—without protective gear.

The scientific forces were based on Makarinsari. The island of "special science" probably remains the most dangerous in terms of the remaining traces of radiation. The most contaminated sector of dry land lies 10 meters from the waterline—alongside the stern of the Kit. At that time the storage facility for the radioisotopes was located there. Despite the extremely careful attitude toward active solutions, leaks most likely happened nonetheless. The soil here "sings" loudly.

The tests of radioactive charges in the bays at Myuarka should be recognized as being extremely far from humane. What was probably being studied was the radioactive effect on water. In this process they used horned ground mines, to which they attached a container with radioisotopes. After the detonation, young sailors in the ship's boats hurried to the epicenter and used special methods to take samples of the "contaminated" water. Of course, they would forget about caution, and radioactive substances ended up on their skin, their clothing and in the boat. Today one can guess the consequences of the experiments, which were stopped in 1955.

For many of the test participants service at the test site ended even earlier. As a rule, people lasted one or two seasons. Then they landed in hospital. They were treated for unexpected diseases, which were often difficult to explain. The most frequently observed problems involved the functioning of the locomotor system and the respiratory and digestive organs.

And what were the consequences of these ominous experiments for the residents of the Ladoga area and for the ecology of the lake, which provides water to an enormous region?

The total secrecy of the experiments conducted at that time makes it impossible to answer that question. As we mentioned, there are no archival materials. There is now only the opinion of the specialists who have studied the problem of the test site. These are people of science, who have survived the crucible of the clean-up work in Chernobyl. Specifically, the scientific group of A. Katkov, a well-known Leningrad scientist, after summarizing many years of experience in the radiological monitoring of Ladoga, came to the conclusion, stated in a book, that the content of dangerous radionuclides in the water is significantly lower than the MPC, the maximum permissible concentration. The specialists from the Radium Institute drew a similar conclusion.

For now the monitoring of the ecological situation in the Ladoga region will be carried out by scientists from a department of the Ecotoxicometric Center of the USSR Academy of Sciences, which was established recently on the former test site. Ecological conversion will help the lake...

And one last thing. Only a part of the truth about the Ladoga problem has been uncovered. But what part is it? The larger part or only a small part? What is there still to find out? Which of the witnesses will respond this time?

### 1990 White Sea Pollution Investigation Continues To Produce Theories

91WN0504A Moscow KOMSOMOLSKAYA PRAVDA  
in Russian 8 Jun 91 p 4

[Article by KOMSOMOLSKAYA PRAVDA special correspondents K. Belyaninov, O. Volkov, A. Kosulnikov, V. Nedogonov, and V. Umnov, Arkhangelsk Oblast: "A Chasm Full of Stars Opened Up: An Expedition by the Inquisitives' Club Has Returned From the Shore of the White Sea, Where a Year Ago a Disaster That No One Can Explain Occurred"]

#### [Text] Maritime Disease

At that time 6,000,000 starfish were cast onto the shore of Dvinskaya Guba.

"They themselves were to blame," Vasiliy Afanasyevich Sysoyev, chairman of the emergency commission and the oblast environmental protection committee, who is unaccustomed to getting overly excited, said in a soothing tone of voice. And he cited the findings of the Zoological Institute of the Academy of Sciences.

The starfish had rushed to a dying settlement of mussels, on which they feed, but the weather was also unseasonable: the ice had left two weeks early, and there was a strong wind in the direction of the shore. So the gale had cast up onto the shore the starfish that did not manage to get to the bottom.

As the expression goes, if they died, then they died...

One and a half months later USSR Academy of Sciences Corresponding Member A. Yablokov, deputy chairman of the parliamentary Committee for Ecology, analyzed the medical statistics in Primorskiy Rayon in recent time (see KOMSOMOLSKAYA PRAVDA, 25 April 1991), and came to the conclusion: SOMETHING OUT OF THE ORDINARY had occurred there. No one has been able yet to say with any certainty precisely what had occurred.

So, if, on a beautiful day, millions of animals die under unknown circumstances, who can guarantee that, the next day, people won't die (or become ill) from the same cause?

That is why we are here.

#### On the Shore

Our helicopter was flying over the very edge of the water. Vasiliy Afanasyevich's associates were looking honestly and intently out the windows—this is called an examination of the shore line.

They were already beginning to nod off when suddenly they saw buildings of a strange design, painted green, with camouflage nets. "Nenoksa. Missile test range," Sysoyev said with a slight tone of pride, and in such a firm way that it immediately became obvious that any further questions would be improper. "This is where we are needed," we thought to ourselves, but we did not give any sign of what we were thinking.

The helicopter landed in order to take a breather on a hillock overlooking the sea. It began to drizzle. The large northern-type homes on the shore seemed to become gloomier before our very eyes, and the people who rushed out of the village toward the helicopter were pulling on their sweaters and tying kerchiefs on their heads as they came running. The people know that the people flying on helicopters are usually the leadership—it was not important what caliber they are. You can always ask the leadership a vitally important question: is it possible to eat the fish?

It turned out that at that time, a year ago, a telephone message had been sent to all the coastal settlements: just in case, do not eat the fish. But the second one, which soon canceled the first one, had not arrived at Syuzma. Which, incidentally, is not surprising—there isn't any telephone in Syuzma, just as there isn't any communication at all. There is absolutely nothing here—no electricity, for example. Flour is dropped to them once every half-year. In order to get kerosene, they have to go to the closest populated point, which is 12 kilometers away. However, they do have a television receiver, which the entire village looks at from time to time, by hooking up a low-power portable generator. They also have a tiny little wooden church without crosses, but with a persistent smell of urine, that does not yield to the sea breezes. And the appropriate inscriptions.

The people do not grumble—they're used to this life. Only the oldtimers recall that, immediately after the war, they had electrical light and communication, but then everything had disappeared somewhere.

As for the starfish, the residents of Syuzma took a rather calm attitude to their appearance a year ago, although this was the first time they had seen anything like this. Perhaps they had other things to worry about: They really needed to have at least one telephone. It would be nice to get newspapers a bit more frequently than once a month ("A war could come, and we wouldn't even know it"). But, most importantly, it would be nice to be able to eat the fish. Since, generally speaking, there isn't anything else to eat.

It turns out that it is indeed possible to eat the fish. Except that people are not allowed to catch them—the fish protection service has not yet given its authorization...

We managed to find out a few other things at another settlement—Pertominsk. The chairman of the settlement soviet told us that last year seven men had died of cancer before they had reached retirement age, that

submarines frequently appear on the horizon, and that a year ago a whale had been tossed up onto the shore. They had attempted to tow the whale back into the sea, but when they had been unable to do so, they had eaten it, despite all the bans issued by the oblast. At the Per-tominsk sel'po [general store] you can buy real American Marlboro cigarettes. The narrow sidewalks here are made of pine. If you see someone coming toward you, you stop and let him pass, or you greet one another and then walk around one another courteously. Our traveling companions really bought a lot of bread, explaining that the bread here is the tastiest on the shore.

### Hysterics

We are looking in the wrong place and for the wrong thing! Why, then, does the most unnatural version turn out to be natural? Because so many "ifs" would have had to combine during an infinitesimal unit of time... But the reasons that would seem to be obvious (those that are behind the fences of closed projects) are easily swept away...

It was not until a month after the beginning of the disaster that the emergency commission began operating, and much of the physical evidence had proven to be lost forever. The piles and piles of dead starfish—the largest one as big as the palm of your hand—had been burned and buried long ago, (along with the mussels and the crabs). And the sea water had already been renewed many times, so that even an electron microscope itself would not notice in it what have been visible to the naked eye a year previously...

For official ecologists who have been given even the slightest amount of power, of course, it is more advantageous to prove that the mussels were to blame for all of this. Mussels are fools—you can't get anything out of them. So we have to search for real ecologists—even if they might be a little "nutty"—because they are the only ones who have grabbers.

### Grabber

It turned out that in a supersecret military unit in Nenoksa there is a piece of equipment for pumping military fuel. The only one in the entire district. So now we proceed along the chain that was constructed by Severodvinsk deputy Oleg Khimanych.

On 7 December 1989 in the White Sea, 105 kilometers to the northwest of Severodvinsk, a submarine has an accident. According to the rumors, one missile failed to fire. It was necessary to jettison one of the fuel components—15.8 tons of nitric acid—into the sea.

But other components remained in the missiles! And they also had to be dumped somewhere. Where else if not at coastal Nenoksa? The military themselves admit that in January the piece of equipment was operating.

Everything would seem to match up perfectly: the submarine moors at the shore, the highly toxic fuel is

urgently pumped out of it, and it is dumped directly onto the ice. In the spring the ice floe floats away entirely into the sea and melts somewhere nearby.

"You will still see things that are not right in the Arctic," Khimanych said. "Along the shore—and I have walked as far as Tiksi—entire army complexes that have served their time are rusting on their foundations—with antennas, radar stations, structures for official purposes and for everyday purposes, pools of motor vehicles and tractors... Don't dig there, guys."

### Facts That Do Not Prove Anything

On 24 October 1990, when petroleum products were being washed away from the edge of the land that had been occupied by a fuel and lubricants depot at a certain military unit, 19.8 kilograms of petroleum products got into the water.

On 13 December, when engine fuel was being pumped into the Kineshma tanker, 650 kilograms spilled into the sea.

On 19 December, 912 kilograms of petroleum products were dumped from a VMF [navy] vessel.

In February 1990 the locomotive roundhouse at Kuloy Station dumped runoff water containing petroleum into the Nenyushka River (750 cubic meters a day).

In order to supply the population of Severodvinsk with water, the Sevmashpredpriyatiye PO [Production Association] built a dam at the source of the Solza River. An area of 240 hectares of forest was flooded, and the forest died.

### At the Test Range

"Keep in mind the fact that you are being given a pass only as an exception," a person wearing civilian clothing, who proved to be the senior person, told us at the station. "And remember, incidentally, that you have the right to spend only one day in Nenoksa."

All the buildings of Nenoksa ran slowly down to the lake, leaving on the hill a place for two wooden churches with a bell tower. Nenoksa gleamed with the fresh boards of the recently built homes. And Nenoksa, finally, was surprisingly calm. Except that we saw rising over our heads nearby searchlight towers of unknown purpose, which subsequently proved to be the invariable attribute of a missile test range...

"My name is Fomenko. I'm the unit commander," a captain first rank said, introducing himself, and then he suddenly added: "Do you know that there used to be very big salt mines in this settlement. The ladies would order stylish hats directly from Paris. At one time Vera Figner was exiled here, and the local supervisor of gendarmerie made her move to another village?"

The commander proved to be a good local historian. Although his circle of interests is not limited to that.

"Our unit was created for the purpose of testing new types of equipment," he said, sweeping aside all questions at once. "We get an experimental 'article' from the plant. We equip it here with the necessary apparatus and launch it. We cannot discuss the charges or warheads."

The fact that missiles from Nenoksa have been flying out into the Pacific Ocean for about 30 years is something that can be told to you by practically any local lad. And the locals used to take a calm attitude toward the explosions which at one time used to occur at the hill close to the settlement practically twice a month.

"We have a special instructional guide," Vladimir Nikolayevich explained, "according to which, when we conduct especially dangerous tests, we are obliged to take all the settlement residents out of town. So we do that: we put them on trains going to Severodvinsk. Then they come back."

"Wouldn't it be easier just to move the test range somewhere else?"

"We recommended to the command element that a special bomb shelter be built in Nenoksa, but for the time being there has not been any decision. In addition, the last test that represented any potential danger to the inhabitants occurred in 1984. Currently this pertains only to the village of Syuzma: it is located directly on the missile flight path. As you can realize, the articles are experimental, and absolutely anything could happen."

In Syuzma we did not hear any claims expressed against the military.

If one speaks of starfish, then Captain 1st Rank Fomenko proposes a natural version.

"Nothing from our side could have got there! Missile fuel is basically ordinary kerosene. Leakage is completely precluded, and we even use fuel that is packaged at the plant."

"But wasn't there an instance when, a half-year ago, there arose an emergency situation on a submarine, and, according to the instructional guide, it had to jettison all the fuel, and, incidentally, according to completely unofficial data, the fuel from that submarine was pumped at your base?..."

"I report that that incident actually did occur. It was an extremely critical situation, when absolutely anything could have happened. And we were actually forced to pump the fuel out of the submarine's tanks into our own storage tanks, using the equipment assigned to us. Not a single enterprise—neither in Arkhangelsk or in Severodvinsk—wanted to accept it. So we had to convey it ourselves to special plants. But that was the only incident in the past 20 years."

"And you completely preclude the possibility that your own missile could have fallen into the water of the bay?"

"There have been accidents, but practically all of them have been over the Arctic coast. We launch missiles to tremendous distances..."

"But why are you constantly talking about starfish?" Vasily Afanasyevich Sysoyev asked, clasping his hands. "In the Kara Sea, in Amderma, the military dumped onto the ice covering Toin-To—the only fresh-water lake in the district—some kind of trash. Soon the ice will begin to melt, and the settlement will be left without water."

### In Polar Amderma

People have been forbidden to drink here. Not in the sense of a dry law—in that respect you can drink everything that you can get. It's just the water you're forbidden to drink.

Instead of the customary display with photographs of advanced production workers, there is an iconostasis with skillfully drawn portraits of the regiment's advanced officers and warrant officers.

Last winter, fuel (according to various estimates, from 20 to 120 tons) quietly poured out of a boiler room on the shore of beautiful Toin-To. And it found its way onto the ice covering the lake just 70 meters away from the water intake.

Petroleum products are special. In the North, to prevent the fuel from crystallizing in the freezing temperatures, so-called "I [letter] fluid" is added to it. It is ethyl cellosol, with a large number of poisonous and toxic additives.

The spot was discovered accidentally. But it was not until a month later, when the fuel had already had time to be absorbed into the ice for a depth of approximately 40 centimeters, that rumors began to fly through the settlement about the dirty water, the increase in the illness rate among children, and about infections that no one could explain. Quiet panic arose in the kitchens. In the middle of the school year, the children were suddenly taken out and sent to "the Big Country." With airplane tickets at the very peak of the winter, just like during the vacation season...

In a big city you can "sit down at the telephone" and call the ZhEK [housing-operation office], SES [sanitation and epidemiology station], or the rayon ispolkom. In Amderma almost everything is departmental, is under the jurisdiction of various ministries, and you have a tough time figuring out who is responsible for what! In "the Big Country," at the Arkhangelsk Oblast Ispolkom, people say that even the toilets here are subordinate to different ministries. A neighbor who wants to make a trip there, even an urgent one, finds the road closed to him...

The water-supply line belongs to the army. For a month the leadership remained silent. They simply began to set fire to the spot, right on the ice. Nothing happened.



By then the rumors had reached the okrug and oblast centers. Commissions made loud noises. They conducted a search for a long time by their joint efforts, but they could not find the culprit (as a result, everyone was satisfied to accept an abstract figure of a handleless private who had not completely tightened a certain nut).

In the final analysis, after computing the almost 2 million rubles worth of damages and having expressed a large amount of abusive language, people remembered about the approaching spring and the thawing of the snow. The military were required to remove the dirty ice immediately.

Currently the operations have been practically completed. For the time being, the analyses conducted by specialists from Arkhangelsk indicate that the fuel did not get into the water. Although the concentration of "I" fluid in the ice exceeds the PDK [maximum permissible concentration] by a factor of 1000.

"Why get needlessly indignant?" Yevgeniy Obertenjuk, state inspector for environmental protection, explained. "I spent probably half a year of my life to impose a fine of 350 rubles on the regiment for maintaining a dump in the middle of the military housing area. It is impossible to reason with them. In addition, we are all tied together with the same rope. The chief of our SMU [construction-installation administration], at a rally, shouts that he is in favor of a nuclear-free North, and someone from the crowd asks, 'Well, buddy, wasn't it you how built that test range for them?' We get indignant, but good-naturedly. We joke that, after the next explosion on Novaya Zemlya, the acid rain will wash off all the starfish on the aircraft wings... But if we can talk seriously, we are living together, and we are also dirtying up the environment together..."

#### Visiting the Rear Admiral

Rear Admiral Nikolay Pakhomov, chief of staff of the White Sea Naval Base, was practically the only military man in that emergency commission "to deal with the starfish." He unrolled for us a top secret map of the White Sea, in the middle of which were two small squares: "submerged explosives."

"They're not dangerous. Most probably. But we really don't know what's lying on the bottom there, or what it has to do with the starfish," Nikolay Pavlovich explained. "It's just too expensive to find out... Of course, they might explode," he said, anticipating our question. Then he said that the life of a general in the North is no bed of roses. You yourself have to dig out the stumps and plant the potatoes—and in confirmation of that he stretched out his scratch-covered hands.

Obviously we had poked our way into the wrong office.

#### At the KGB

The official oak doors slammed behind us.

"Yes, our associate went there. At first we thought it was a provocation. But when we were convinced that there was no deliberate intention there and that everything was natural, we closed the case..."

#### Alongside the Submarines

For the most part, the city of Severodvinsk, which until recently had been absolutely closed, is not a city at all, but something like a "make-weight" to the Northern Machine-Building Enterprise. If the country had not suddenly felt a critical need for submarines, this city would probably not have arisen at all.

We did not know anything about the SMP [Northern Machine-Building Enterprise]. It was known, of course, that the enterprise has been producing submarines since the late 1930's, that new models are tested here in the White Sea, and that, in the final analysis, old nuclear reactors that have exhausted their service life are also replaced at this machine-building enterprise.

The submarines actually go out to their tests directly from the plant's slips and carry out test firings not too far away from the shore. And, yes, the reactors are replaced, but deputy director Viktor Petrushin does not know how that is done or what happens to the fuel and the housings.

"We have a special shop where the military work, and not even I am allowed to enter it. The used reactors are removed from our territory, but no one knows where they go. I have been living here for 30 years and and so far I haven't heard anything about any special burying ground in the North. True, there have been rumors to the effect that they have been dumped into the Barents Sea, but those are only rumors."

Although, Viktor Antonovich assures us, that is just a minor point. And even if the reactors are dumped into the northern seas, they will not make their presence known for at least 300 years or so. But the White Sea has a chance of dying much earlier than that.

"You figure it out yourself: in the course of one year our enterprise alone carried out to the ordinary city dump 200,000 tons of trash. The city has two such enterprises, plus a large number of small plants. The share of highly toxic waste is no less than 10 percent. And the level of the ground water in the oblast is only half a meter deep..."

"Incidentally, the killing of our starfish," Viktor Antonovich reminded us, "could well be linked with the leakage of highly toxic waste. And if that is confirmed, you can be assured that the starfish are only the first signal."

#### People and Starfish

It would seem that the sea that has fallen into the area of our strategic interests is doomed. It will simply be painted white on the maps, and be provided with observation towers. Go to the right and there will be KPP



[regimental command posts]. Go to the left and there will be a barbed-wire fence. If you want to live long enough to retire, don't let your eyes stray to the left or right.

And that is how people have lived until now. So far, because of someone's obvious oversight, information about the unfortunate starfish did not leak out into the world. At first that information caused a ruckus only in certain free-thinking capitals.

But when people begin to be afraid, the serried ranks break down and the order that the army heart holds so dear collapses in an instant. Slightly at first, a few people are beginning to guess that here, in the White Sea, people would look much more sympathetically not at missile-tracking stations, but at multicolored beach umbrellas and cabanas.

And so, from completely banal fear, there is born a large freedom-loving idea, and people appear who are impatient and who up until now were unknown in these parts of the country.

We, of course, found a person like this. And, of course, the only one in all of Severodvinsk. That person proved to be Emiliya Ivanovna Galibina, a teacher at the local polytechnicum.

It was she, together with her students, who organized the mass burials of Arkhangelsk flora and fauna (they walked through the housing area with a child's coffin), carried out at the secret project a defiant ecological volunteer clean-up day, and, finally, as something absolutely unheard of, invited Swedish schoolchildren to the closed city.

So the starfish had not died in vain. Things had started working: a flame leaped up from them. And fire in the cold North is a big force. Even in the hands of just one person.

Somewhere in Volgograd or Ufa, Emiliya Ivanovna would be lost in a crowd of people at a rally. What has already become a tradition throughout the country still has to be drummed into people's heads here.

Emiliya Ivanovna had learned from the newspapers about the death of the starfish. It was precisely at that time that she got a new ecological idea—the idea of writing a letter to USSR People's Deputy A. Yablokov. The letter proved to be successful. It was prepared in accordance with all the democratic rules: with appreciation “for activities in the fight for a clean environment.” And the guys really made a bit effort—they got 15,000 signatures on the letter.

There is a fear that the story of Severodvinsk democracy that was engendered by the tragedy will remain incompletely written. Neither Emiliya Ivanovna nor any other bold individual, even if such a person could be found, is capable of fighting all alone. And our democracy does not yet know any other form of freedom-loving other than the struggle.

Will Emiliya's enthusiastic zeal last for long? Who else, then, will have to be thrown up onto that shore in order to pull the unhurried inhabitants of the Arctic from the places they have occupied for so long, and to excite them with the intoxicant of real freedom?

People say that it has already been about five years since the cod left this sea. But the people are calm. There are no cod, and there is nothing you can do about it. The next species to go will be the “khek.”

### On the Bottom of the Sea

When KOMSOMOLSKAYA PRAVDA reported its intention to begin its own investigation, the editorial office received a large number of telephone calls. One of them was a special one. Pavel Pavlovich Sapozhnikov, a retired colonel from Arkhangelsk, said that, a couple of times, he had heard a story to the effect that, in the mid-1950's, a tremendous quantity of chemical ammunition had been buried in the White Sea.

It was no easy matter to find two participants in those ancient events. Two retirees—Aleksandr Stepanovich Kozlov, who had served at that time as a warrant officer, and Ivan Vasilyevich Glushkov, who at that time had been a company commander.

The incident had apparently occurred in the summer of 1954. For three or four months in a row, day and night—true, the nights here are as bright as the daytime—military trains containing shells had arrived at the port of Severodvinsk. No one knows what kind of shells they were: there were no distinctive markings on the boxes, although there had been rumors to the effect that they were chemical weapons. Especially since it was precisely at that time that army was frontally armed.

Soldiers—it is difficult to state definitely whether they were from the battalion or the regiment—took the boxes directly off the train and loaded them into large-capacity barges. The barges were taken out to sea and then returned empty 10-12 hours later.

“At that time we did not think about what we were sending out to sea,” Ivan Vasilyevich admitted. “It is only now that the idea has popped into my head: what if this is what killed the starfish? Because it could have taken this amount of time for the sea water to erode the shell casings...”

That might be so. A positive reaction to mustard gas was produced by analyses of samples of starfish (as well as fish that live at the sea bottom) that were conducted at the Arkhangelsk Fish Combine. Incidentally, the results were refuted by the commission on the grounds that there had been only qualitative, rather than quantitative, research.

Repeated analysis (there has been no success in establishing when it was carried out) did not confirm the presence of mustard gas. Let us consider, nevertheless, that that substance decomposes quickly in sea water.

As we have learned from a reply from the Ministry of Defense to a question raised by RSFSR People's Deputy A. Butorin, prior to 1989, on the basis of official documents, it was authorized to dump ammunition into the sea. Because until the present time the enterprises do not have any recycling need for them...

Therefore it would appear to us to be an extremely important task to establish this burial site. We ask for a response from everyone who took part in 1954 in the loading, transporting, and burial of those mysterious boxes. Our telephone number is 257-27-65.

Perhaps this is only a made-up story. Perhaps it does not even have anything to do with the killing of the starfish. When we set out for Arkhangelsk, we wanted to investigate what had killed the starfish in the White Sea. But apparently we realized what can kill people.

And it can "explode" absolutely anywhere.

Finally, we managed to find out the main point: the White Sea is practically the cleanest one in the Soviet Union.

#### More on White Sea Contamination Investigation

PM1406080491 Moscow KOMSOMOLSKAYA  
PRAVDA in Russian 13 Jun 91 p 4

[Unattributed report: "What Is at the Bottom of the White Sea?"]

[Text] Following our account of the mission to the White Sea (KOMSOMOLSKAYA PRAVDA, 8 June), V. Vasiukaya, a scientist at the Institute of Oceanography and a member of the emergency "starfish" commission, telephoned our editorial team and reported: In fact, two studies carried out completely independently of each other in Leningrad and Rostov-on-Don revealed clear traces of a highly toxic substance.

We discovered the name of the former captain of the squadron which dumped chemical munitions into the White Sea in the 1950's. We will pay him a visit soon.

Finally, we received a very interesting call. The caller (who asked to remain anonymous) served in the convoy troops in 1960-1961. He was commander of a guard escorting a military convoy—up to 60 railcars—carrying aviation chemical bombs. They carried them from Leonidovka Station in Penza Oblast to Pechenga in Murmansk Oblast. Then, according to the sailors, they dumped them in the Barents Sea...

#### Environment Minister Hopes for Nordic Subsidies

LD1206174391 Helsinki Suomen Yleisradio Network  
in Finnish 1600 GMT 12 Jun 91

[Text] Soviet Environment Minister Nikolay Vorontsov hopes for interest subsidies from Nordic countries for the modernization of the Kola nickel smelting plants. Speaking in Rovaniemi at the current meeting on the

Arctic environment, Vorontsov stated that interest on the loans needed for modernizing the smelters could be divided between the Soviet Union, Finland, Sweden, and Norway. Vorontsov was also concerned about the constantly inflating costs of the smelter project.

#### Source of Radioactive Contamination in Mikun Explored

PM1206120991 Moscow SOVETSKAYA ROSSIYA  
in Russian 6 Jun 91 Second Edition p 6

[TASS report: "Radioactive Source Found"]

[Text] Mikun, Komi SSR—A powerful source of radioactive radiation has been discovered in the area of the city of Mikun in the Komi SSR during aerial gamma spectroscopy filming. A ground search led to the premises of the Mikun locomotive depot repair facilities and laboratories. The level of external radiation in a number of places was about 10,000 times above the health limit.

According to preliminary data, the source of the radioactive radiation is cesium. An investigation is under way to determine which cesium compound is involved, and when and how the contamination of the premises and the surrounding area took place. Decontamination of the area is nearly complete. Medical personnel examined the people working there in emergency conditions, as yet no anomalies have been found. It is intended to carry out an even closer medical examination of these workers, and also of everybody who has visited the repair facilities and laboratories. The identities of these people are being established.

It is assumed that the radioactive contamination occurred as a result of careless use of appliances containing cesium compounds. But at present this is not clear. Depending on the results of the investigation, the case will be referred to the Prosecutor's Office.

#### Lemeshev Scores Foreign Influence, Stalin, Others in Volga Development Schemes

91WN0469B Moscow PODMOSKOVYE in Russian  
No 17, 27 Apr 91 p 6

[Article by Mikhail Lemeshev, doctor of economic sciences and member of the governing board of the Committee To Save the Volga: "The Fruits of a Satanic Plan"]

[Text] Everything in the world is interrelated. Unwise economic policy is destroying our once rich and flourishing country. Scientists believe that we are on the verge of ecological catastrophe. How can it be avoided? The author of this article, which will be published in full in the journal NASH SOVREMENNİK, tries to answer this question.

I think that first of all each and every person must clearly recognize that the dangerous illness of the Volga is the

result of the social-ecological sickness of the entire country. It is not only the Volga which is in danger, but the fate of our Motherland which is in danger. The threat of economic ruin, social disasters, and ecological catastrophe hangs over the country. And what is the reason for the dramatic situation? How have we come to such nation-wide calamity? I am certain that people's **alienation** from the land, from the waters, from the means of production, and from the product produced by them and their indifferent attitude toward nature, their own labor, other people, and public interests are to blame for everything.

We have surpassed all countries of the world in terms of volume of industrial production directly related to exploitation of nature. The USSR produces more of the following than the United States—mineral fertilizers—by a factor of 1.4; oil—by a factor of 1.6; natural gas—by a factor of 1.7; cement—by a factor of 1.9; steel—by a factor of 2; iron ore—by a factor of 4.4; tractors—by a factor of 6.2; and grain harvesting combines—by a factor of 6.9. And that is even when in terms of population our country surpasses America by only 15 percent. Comparing our economy with worldwide parameters is very instructive. The USSR accounts for 5.3 percent of the world population. But at the same time, our country provides 13 percent of the world production of cement, 16 percent—of electricity, 21 percent—of oil, 21 percent—of steel, 22 percent—of mineral fertilizers, and 42 percent—of natural gas. As we see, the scale of production destructive to nature is simply fantastic. But this is what is surprising. The more products listed which are produced, the greater the shortage of them becomes.

Let us recall that in 1990 the record harvest of grain was lost in many rayons because there was no fuel for the combines and motor transport and a great power was reduced to obtaining charity from foreign countries in order to supply the population with food.

So what is going on in our country? Where is the labor of millions and millions of Soviet people going? Above all the reason for this abnormal situation is the criminal policy of foreign economic relations which is expressed in the sale, destructive to the country, of our natural resources—oil, gas, timber, and ferrous and nonferrous metal ores—abroad at dumping prices. In 1989 127 million tons of crude oil and 57 million tons of light petroleum products were sold abroad, while our citizens sit in airports for days because of the lack of kerosene for planes and car owners toil for hours in lines at gas pumps because of the limit on fuel.

That same year 101 billion cubic meters of natural gas were sent to foreign countries. The country's territory is crisscrossed by a network of main gas lines, while thousands of settlements and villages in Russia, the Ukraine, and Belorussia live without gas. Ministries use hard currency earned to buy drilling equipment, pipes, and compressors to extract more and more raw materials, and that entails the depletion of nature and the ruin of the habitat of whole peoples of the North and Siberia.

The mining of iron ore in the center of Russia has destroyed hundreds of thousands of hectares of unique chernozem, dried up rivers, creeks, and wells, and destroyed the region's forests, orchards, and meadows; while the country is buried in scrap metal, which the departments also sell abroad. After all, the smelting of steel from scrap metal requires one-seventh to one-eighth the energy and yields one-eighth to one-tenth the pollution.

Every year 29-36 million tons of iron ore, up to 1 million tons of manganese ore, 5-6 million tons of potassium fertilizers and the same quantity of nitrate fertilizers, and 19-20 million cubic meters of rough timber are exported abroad and 38-39 billion kilowatt-hours of electricity are transmitted abroad.

The assertion by the departments that our country has a growing energy shortage has become commonplace. But the shortage is the consequence of colossal consumption of energy for developing all those raw material production facilities which are ruining nature and the economy.

But let us return to the fate of our suffering Volga. A series of hydroelectric power plants [GES] with gigantic decaying reservoirs which destroyed the unique fish resources of the Volga-Caspian Basin was built to cover the artificially created shortage of electricity on the Volga. The chemical and petrochemical plants which are nestled along the river's shores make their destructive contribution to polluting the once **living water** of the Volga. Many of these plants were built on the initiative and using the designs of foreign entrepreneurs, in particular the great "friend" of the Soviet Union, the American multimillionaire Armand Hammer. This genius of profit, in addition to many other predatory operations on Russia's territory, built 10 ammonia plants for us, including on the Volga, which brought him 20 billion dollars in profits and gave our country dangerous pollution which continues even now and accidents which follow one after another.

In May 1990 another major deal between the Soviet departments and French businessmen was made, to search for, extract, and process oil in the USSR. The first deputy minister of the USSR Chemical and Petroleum Refining Industry Mr. Nikitin, the first deputy minister of the USSR Ministry of Geology Mr. Salmanov, and the president of the ELF Aquitaine Company Mr. Le Flok-Prizhen [name as transliterated]. I must make the proviso here that it was certainly not the author of these lines who called our management figures "mister." That was how it was announced in PRAVDA on 14 July 1990. The territory in the Volga delta with an area of **35,000 square kilometers** was the object of the deal in this case! Commenting on this event, PRAVDA noted with particular feeling that with this deal "the USSR for the first time is opening its interiors to a foreign oil partner." But should we rejoice at this event? It is common knowledge that the Lower Volga Region is an ecological disaster zone even without that. And what will happen to it as a result of additional activity by foreign firms here? Of

course, there were more than enough assurances from both our leadership figures and the French owners that our foreign partners have the most refined and most ecologically clean technology. But tell me, when did we ever experience a shortage of them, these promises and assurances? The structure of the company's financial balance gives a realistic idea of the ecological level of the ELF Aquitaine Company's technology. Expenditures for protecting the environment make up slightly more than one percent of the company's total financial turnover. For comparison let us point out that in the United States these costs average 2.5 percent and in Japan—three percent of the gross national product. So it would be much more useful to replace the delight with which our mass information media evaluates this latest deal of the century with an objective social-ecological expert review.

Nor do our domestic slick operators lag behind the Western plunderers. Among others, the gigantic octopuses of the ministries of Power and Electrification and of Land Reclamation and Water Resources were the most active plunderers of the Volga for decades. The first turned the living water of the Volga into dead water by plugging it up with clots of dams and creating an unbroken chain of decaying reservoirs, and the second—by destroying millions of hectares of fertile meadows and pasturelands in the Volga region through irrational, criminal development.

And how can the flooding of an enormous number of settlements and villages and several ancient cities be passed by in silence? Stavropol was buried by the waters of the Kuybyshev Reservoir, from Kalyazin only the suburban villages remain on dry land, and the entire lower part of the settlement of Myshkin is under water. And the ancient Russian town of Mologa with its churches and magnificent Afanasyev Monastery went under the water of the Rybinskiy Reservoir. And how about the flooded Korcheva and Puchezh?

The tragedy of ancient Volga cities which were ruined is manifested particularly clearly in the fate of Mologa. This city stood for many centuries on the left bank of the Volga, at the mouth of the navigable river Mologa, from which the ancient settlement got its name. In the 12th century Mologa became part of the Rostov Principality and in the 13th century—the Yaroslavl Principality. The Tsar of All Rus Ivan III gave Mologa to the estate of his son Dmitriy, the Volgan prince. A fair famous throughout Ancient Rus was established here. In the 17th century Mologa was a court trading quarter and in 1777 officially received the status of district center.

The city lived its quiet, comfortable life for more than one and one-half centuries. Even the dark days of the ruin of Russia in 1917 seemed to bypass it. Misfortune came in 1936, when the 1 April issue of the newspaper SEVERNIY RABOCHIY published a conversation with the chief of Volgostroy, Ya.D. Rapoport, where that person reported on the satanic plan to flood a vast area of Volga territory in connection with the construction of the Rybinskiy GES. According to this plan, the city of

Mologa and 663 villages which combined 40,000 peasant households were to be moved. A terrible outrage was visited upon hundreds of thousands of Russian people, and the officials who did this evil painted it in heroic outlines. The protocol of the combined plenum of the gorkom of the VKP(b) [All-Union Communist Party (of Bolsheviks)] and the Mologa city soviet announced: "After hearing and discussing the report of the Chairman of the City Soviet Comrade Nazarov 'On Reconstruction of the Volga' and turning it from a shallow river into a deep one and, through the Oka and the Moskva connecting it with the first capital of the world, the great Red Moscow, the plenum expresses its joy and admiration for the brilliant wisdom of the initiator of the reconstruction of the Upper Volga, our teacher, friend, and chief of the world working class—the great Stalin."

You can judge how the resettlement went by the recollections of witnesses. Brigades of prisoners from Volga Camp went through the villages and expelled the residents by force and by force removed or burned the houses.

It was not only people who suffered. Nature suffered heavily too. The forests which were not saved remained on the bottom—including the northernmost oak forest in the world (and cooperative members now want to raise the water-seasoned oak). About 15 years ago the last remaining forest fell, and now it rots on the bottom. At low water when the bottom is exposed, from a helicopter this forest looks like densely scattered matches. But no one learned the lesson of the first "experimental" Rybinskiy Reservoir: not one of the bottoms created as a result of construction of subsequent reservoirs was prepared properly. As a result the Volga was turned into a chain of decaying reservoirs. Stagnant processes developed. Living Volga water no longer exists.

And why are all of these outrages being committed? People say that it is to cover the shortage of electricity. But certainly that is a lie. Think, reader, about the following information. The electricity produced by all the gigantic GES's of the Volga series makes up less than two percent of the total volume of electricity produced in the Volga Region (PRAVDA, 18 April 1990). It is precisely for these pitiful two percent that a great river—the cradle of Russia—is being destroyed!

### **Green Party Leader Appointed Ukrainian Ecology Minister**

*LD1906114591 Moscow Radio Rossii Network  
in Russian 1100 GMT 19 Jun 91*

[Text] Our Kiev correspondent has reported that the Ukrainian government became a coalition government this morning. The republic Supreme Soviet has confirmed the world famous doctor of medicine and writer, Yuriy Shcherbak, as state minister of ecology. He is the leader of the Green Party of the Ukraine. The tradition of multiparty government destroyed by the rout of the Ukrainian People's Party in 1920 has thus been reestablished.



### **Gas-Fired Thermal Power Station To Replace Crimean Nuclear Plant**

*LD1406221991 Moscow Central Television First Program Network in Russian 0900 GMT 14 Jun 91*

[From the "Television News Service" program]

[Text] Now from the ecological problems of the White Sea to those of the Black Sea. After the announcement on TSN [Television News Service] in connection with rumors about the resumption of the construction of the Crimean Nuclear Power Station [AES], the Crimean authorities prepared a reply. Here is a commentary by a specialist.

[Unidentified specialist]: Evidently the cause of the rumors was the concluding session of the IAEA [International Atomic Energy Authority] group of experts and the Italian firm ISMAS, [not further identified] which is conducting additional research on the site of the former AES on the orders of the Ministry of Atomic Power.

We have drawn up a decision of the Cabinet of Ministers. A clause is being worked on at the Ukrainian Council of Ministers, to the effect that a gas-fired thermal power station is to start operating on the site of the former atomic power station. There will be two pairs of gas installations with an overall capacity of 70, million kilowatts.

[Correspondent] Sergey Aleksdandrovich, when will that station start operating?

[Specialist] The draft decision states 1996: that is the first power unit. The gas industry is charged with allocating 1 billion cubic meters of gas for this station.

[Correspondent] It is being proposed that nontraditional forms of energy - solar, wind power, and so forth—should be used more extensively.

[Specialist] This point has been worked out and it is included. But you yourself must understand that at the present time the capacity of non-traditional sources is not large. We are totally counting on the thermal station, which will be constructed on the site of the former nuclear power station. [video shows official being interviewed in front of unfinished power station, women holding placards, and pictures of solar power installations]

### **Plans for Kirovograd Ore Plant Criticized**

*PM1106123591 Moscow Russian Television Network in Russian 1700 GMT 2 Jun 91*

[From the "Vesti" newscast: Report by Yu. Repeynik, A. Uzhva, identified by caption]

[Text] [Announcer] The latest giant industrial plant is currently under construction in the vicinity of Kirovograd. Soon it will poison everything in sight. And what

is more, it is being built on a geological fault so that, to cap it all, it may explode, provided it is not first swallowed up by the earth.

[Repeynik] Thanks to our silent consent, the state is funding ecological saboteurs who are doing their utmost to ensure that life in the steppe around Kirovograd, unpolluted until recently, becomes no better than in the environs of Chernobyl.

The minister of ferrous metallurgy has taken it into his head to build an oxydized ore enrichment combine in Dolinskaya. Almost 4,000 hectares of the best black-soil land has been set aside for the giant plant, which once started up, will rapidly poison Ukraine's underground water resources. We are the victims of gigantomania which no one needs. After all, similar combines in Krivoy Rog are operating at only two-thirds of their capacity. And so another giant is being created which will be half unemployed.

### **Rising Caspian Floods Coastal Land, Endangers Industries**

*PM1206093991 Moscow Central Television First Program Network in Russian 1800 GMT 8 Jun 91*

[From the "Vremya" newscast: Report by N. Levaya, identified by caption]

[Text] [Announcer] One more natural disaster has been added to the list of the earthquakes, landslides, and heavy rains which have hit our country. The Caspian Sea has burst its banks.

[Levaya] The sharp rise in the level of the Caspian has created a complex situation in parts of Turkmenistan along its shores. In some places flooding stretches two-three km inland. The flood waters are threatening residential homes, production premises and railroad lines. Many kilometers of pipelines, highways, and communication and power transmission lines are under water. Thousands of people urgently need to be evacuated. Possible damage to purification plants is fraught with the danger of epidemics. The situation is particularly serious on the Cheleken Peninsula, which may become an island in the foreseeable future. The gravity of the situation is exacerbated by the fact that major chemical and oil extracting and refining enterprises are located here. Aladzha port is out of action. The Karabogaz-Sulfat Association is threatened with catastrophe. If the sea level continues rising, the water will spill over the dam which protects the Kara-Bogaz-Gol Bay and submerge many kilometers of the dry bay, flooding production facilities and the chemical workers' settlement of Bekdash.

From Krasnovodsk Oblast's Ufra settlement fuel and lubricants are supplied to Turkmenistan and neighboring republics; 75 percent of the region's airports receive aviation fuel from here. These supplies are now



threatened with disruption. Storage facilities and pipelines are under water. Given the slightest damage, the petroleum products will spill into the sea.

The presidential apparatus Commission for Emergency Situations is at work.

[passage omitted—interview with N. Illomanov, oblast soviet executive committee chairman]

### **Baku Conference Hears of Dangers to Caspian Sea**

*LD1406163591 Moscow All-Union Radio First Program Radio-1 Network in Russian 1600 GMT 13 Jun 91*

[Text] The first international conference on problems of the Caspian Sea started work in Baku today. our correspondent Islam Kuliyeu reports.

[Kuliyeu] Some 500 Soviet and foreign scientists and specialists are taking part. They include representatives of Russia, Kazakhstan, Turkmenia, Azerbaijan, Iran and Turkey.

The predatory exploitation of the Caspian's riches have placed it on the brink of an ecological catastrophe. The intensive development of oil recovery and petrochemistry in Azerbaijan, Povolzhye, Kazakhstan, and Turkmenia, without ensuring the conditions for ecological safety and putting purification structures into operation has led to a sharp increase in the pollution of the littoral zone and also of a considerable part of the water area of the Caspian. Today Azerbaijan alone discharges over 1.5 billion cubic meters of heavily polluted effluent into the sea.

In the basin of the rivers which feed the Caspian with their water, almost one-third of the country's industrial and agricultural output and electric power is produced.

Fichred Dzhaferov, learned secretary of the Council for problems of the Caspian Sea of the Azerbaijan Academy of Sciences, explains what all this has resulted in:

[Begin recording] As an ecological specialist I can say that the Caspian has approached the point where danger is manifesting itself. That is to say if the mollusks on which fish feed accumulate mercury, lead, arsenic, and if they accumulate copper in such concentrations which have already become carcinogenic for fish, then fish in turn is becoming carcinogenic for man.

Well, the threshold beyond which it is impossible to save the Caspian has not yet arrived.

If today, without stopping and thinking of the Caspian of tomorrow, and do not cease this barbaric attitude toward the Caspian, then the Aral catastrophe will be repeated with the Caspian. [end recording]

### **Ministries Announce Findings in Sverdlovsk Pesticide Poisoning Case**

*91WN0468A Moscow PRAVDA in Russian 15 May 91 First Edition p 1*

[Article by B. Pipiya: "What Happened in the Vicinity of Sverdlovsk: The Ministry of Health and the Ministry of Defense Warn: To Work in Fields Treated With Pesticides Is Not Safe"]

[Text] A "toxic "ghost"—that is how the report was called that was printed in PRAVDA of 19 August 1990 under the heading "Explain What Is Happening?" We will briefly recall what the question was.

In the summer of 1989, students of Sverdlovsk University, during the bringing in of the harvest in the Krasnoufimskiy Sovkhoz of Krasnoufimskiy Rayon felt indisposed. Their feet began to grow numb, headaches appeared. Fifty people were hospitalized with the diagnosis of "disease of the peripheral nervous system."

Last year the outbreak of illnesses repeated itself in the Khramtsovskiy Sovkhoz. Senior pupils of the secondary schools of Sverdlovsk came to weed carrots and turnips. Four to six hours after work, three pupils became ill. After several days, six more turned to the doctor with complaints about pain in their legs, the loss of feeling. All of them were taken away by an ambulance.

Here they raised the alarm. Specialists from the USSR Ministry of Health, the Taifun Scientific Production Association of the USSR State Hydrometeorological Administration, the All-Union Scientific Research Institute for Chemical Plant Protection, the Scientific Research Institute for Labor Hygiene and Professional Diseases, and the USSR Ministry of Defense flew to Sverdlovsk.

Virological, bacteriological, radiological, and toxicological tests of the food products, the water, soil and air of the work zone, the wash water from the leather covers and clothes of the people who became ill were undertaken. It proved impossible at that time to establish at once the precise reasons for the disease of the peripheral nervous system of people on a group scale.

And here not long ago, PRAVDA received documents with the results of the investigation from the USSR and RSFSR ministries of health.

According to the conclusion of the specialists, the illnesses of the young people were the result of the influence of a complex of chemical compounds discovered in the soil and plants. In a number of the samples taken from the fields where the victims had worked, pesticides were discovered in quantities exceeding the maximum permissible concentrations.

The manifestation of the toxicological action of the chemical substances was promoted by the following: Damp fumes from the fields after rains in hot weather and morning fogs; unaccustomed physical loads for the

duration of a working day of up to 10-12 hours in the necessary posture—on the knees; the contamination of leather covers and clothes with dust and soil from the fields.

The basic reason for the contamination of the soil, it is noted in the documents, is the violation of the rules and technologies of the application of chemical means for the protection of plants and mineral fertilizer.

The USSR Chief State Sanitary Inspector signed a decree: "On the Limitation of the Work of Students and Pupils in Agricultural Fields Treated With Pesticides."

Taking into consideration the proposals of specialists of the USSR Ministry of Defense and on the basis of the analysis of the situation, recommendations were developed in regard to the determination of the real chemical situation in agricultural fields, the procedure for the use of pesticides, conditions for the involvement of the population in agricultural work, and measures to prevent the disease of people.

The adoption of a law on the protection of the environment and the health of the population against unfavorable influences of the chemicalization of agriculture seems to extremely important.

#### **Special Program Improving Ecology in Kazakhstan Gas Field**

*PM1406133991 Moscow Central Television Vostok Program and Orbita Networks in Russian 1530 GMT 12 Jun 91*

[From the "Vremya" newscast: Report by I. Dvorkin, D. Gilmanov, identified by caption]

[Text] [Announcer] The main problems that require urgent intervention include ecological problems. A special ecological program has been elaborated and is being implemented in the Karachaganak gas field in Kazakhstan.

[Dvorkin] This is a sign of positive changes at the gas field [video shows bird and butterfly]. Until very recently the gas preparation station was considered to be a kind of dead zone. Insects and birds avoided it. Instead of air, there was a gaseous environment here. It was territory rather than soil. And in general, the production of gas and gas condensate was carried out without a thought for the recultivation of the lands. No anti-pollution and purification installations had been built. And although the pollution has now been reduced and is lower than that produced by motor vehicles, the achievement nevertheless lies somewhere else. Department specialists have stopped thinking in purely departmental terms.

[V.P. Ryzhov, deputy chief of the Kazakh Gas Association, identified by caption] Unfortunately, as yet we have not learned to service the gas field in a civilized way. This applies to truck drivers in particular. That is

why every spring we have to recultivate and restore large areas of land. We are resolving this problem—we think it can be resolved by building industrial roads in advance as a matter of urgency. Normal roads must be built before an installation is constructed, and they should be hard-surface roads.

[Dvorkin] The first 530 hectares of the reclaimed land have now been returned to the local kolkhoz [collective farm]. More reclaimed fields will be handed over by fall. But apart from the soil there is the water and the air to be taken care of... We can see a burning flare. How soon will it be put out?

[Ryzhov] Unfortunately, it will not be put out until the third quarter of this year. We were delayed by the plants which supply us—the science and production associations in Kazan and Volgograd and plants in Bashkiria. On the whole, the Karachaganak ecological program is quite extensive. A large number of scientific research institutes are working in various fields, well, for example you could mention the Kazakh SSR [Soviet Socialist Republic] Health Protection Center. We have concluded contracts with it worth around 2 million. It is studying the health of the population, then will give us recommendations and draw conclusions about the further development of our gas field.

[Dvorkin] The sum of 5 million rubles has been allocated to put Karachaganak right.

#### **Kazakh Deputies Appeal to World Health Organization**

*LD1306153591 Moscow TASS in English 1225 GMT 13 Jun 91*

[By TASS correspondent Tatyana Zhurbenko]

[Text] Alma Ata June 13 TASS—Members of the Kazakhstan parliament's Committee for Women's Affairs, the Protection of Families, Maternity and Childhood today appealed to the World Health Organisation, asking it to examine the real situation in the ecological disaster zone in Kazakhstan's eastern regions and issue recommendations for the survival of the population.

At the same time, committee members demanded that the republic government pass a document regarding large families in ecological disaster zones.

The death of the Aral Sea, nuclear tests at the Semipalatinsk test site, earthquakes in Zaysan and disasters in Ust-Kamenogorsk have led to a growth in the rate of cancer, infant mortality and a high percentage of abnormality and diseases among newly-born babies, the committee states.

Despite the Kazakhstan president's decree on the organisation of assistance to eastern Kazakhstan after the earthquake, deputies discovered foundations for houses in Marka-Kul District already covered with grass, while

they are marked as "intense construction sites" in documents. Exhausted mothers in the districts are absolutely desperate.

"Our numerous demands from various rostra and deputies' inquiries to the republic government have not helped the grieving people and have led nowhere," committee Chairman A. Dzhaganova said.

### Semipalatinsk Nuclear Test Site Visited

LD0906141491

[Editorial Report] Moscow Russian Television Network in Russian at 1400 GMT on 8 June in its "Epicenter" program carries a 50-minute documentary reflecting opposing views on the Semipalatinsk nuclear testing ground in Kazakhstan, interspersed with 1950's footage showing countdowns to test explosions both above and below ground and the consequent incineration of target tanks, MIG aircraft, houses, and sheep; 1947 film of Kurchatov's work on the hydrogen bomb; film of U.S. nuclear testing in the Pacific; and shots taken during a recent visit to the test site by a camera crew.

Veterans of the Semipalatinsk nuclear testing ground recall their enthusiasm for their work in perfecting a hydrogen bomb to defend the Motherland. Local villagers recall that the first they knew of the testing was seeing a mushroom cloud one August, soldiers arriving with radiation monitors, and subsequent deaths in the village from cancer and leukemia.

A.F. Tsib, director of the scientific research institute of medical radiology of the USSR Academy of Medical Sciences, differentiates between the dangerous nature of the above-ground testing carried out at the site from 1949 to 1963 and subsequent "safe" underground explosions.

On the camera crew's arrival at the Semipalatinsk nuclear testing ground, a soldier explains the regulations: 1. it is forbidden without permission to take samples of earth, soil, or water from the site; 2. it is forbidden to take photographs without the presence of an official; 3. it is forbidden to bring in radio transmitters; 4. it is forbidden to leave the nuclear testing ground without permission.

A reporter asks young schoolchildren whether they are scared to live next to the testing ground. They shout "No!" in unison. Asked where they live, they reply "Semipalatinsk-21!"—the name of their town is Kurchatov, but for reasons of security it is Soviet practice to refer to sensitive areas by their postal code.

A radiation monitor shows 14 microroentgens; and F.F. Safonov, deputy head of the Semipalatinsk nuclear testing ground, explains that they are standing at a well, 500 meters below which a 20-kiloton explosion was carried out on 2 September.

USSR People's Deputy N.S. Petrushenko observes: Glasnost has started to be measured in Yeltsins, radiation is measured in Curies, but what are we to measure radiation-phobia in?

V.S. Dobrovolskiy, head of radiation safety service of the institute of nuclear physics, says that there are many rumors, disinformation, and fabrications surrounding the Semipalatinsk site. The video shows a demonstration against the test site. Tsubko, a veteran of the Semipalatinsk nuclear testing ground, asserts that it saved the country from war. N. Zhotabayev, chairman of the oblast trade union council, says that people realize the necessity of the site's existence. A teacher says 18 out of 25 in her class complain of toothaches. A mother says that on the day of one explosion she could not find her son, and eventually found that he had hanged himself in the shed. A wife tells how her husband has been crippled.

The unidentified head of an interdepartmental commission, set up to investigate the ecological situation and people's health at the Semipalatinsk nuclear site in May, states: "There are no illnesses connected with the effects of radiation among the population at the present time. Over the past 20 years the radiation situation around the test site has been normal." V.V. Pavlovich, secretary of the Semipalatinsk CPSU Obkom, and V.F. Stepanenko, member of the scientific research institute of medical radiology of the USSR Academy of Sciences, reiterate this. An unidentified manager of the health care department of the Semipalatinsk executive committee complains that neither the Semipalatinsk nuclear test site nor the country as a whole has given a kopeck for the region's health problems.

M. Belousov, chairman of the (?technical control sector) of a Semipalatinsk cement factory, says that the workers at the Semipalatinsk nuclear test site may not be at risk, since they have proper medication; whereas there is not one proper hospital in Semipalatinsk town. At the cement works a slogan reads "The good of the people is the main objective of the Party!" If it is so safe, why not build a test site near Moscow? he asks.

I.V. Kazachevskiy, head of the activation analysis laboratory of the institute of nuclear physics, commenting on his visit to the Semipalatinsk nuclear testing ground, considers that the site has responsible workers, although they perhaps also would rather not carry out these explosions.

S.G. Smagulov, head of the Semipalatinsk nuclear testing ground radiation service, explains that his people helped clear up the aftermath of the Chernobyl accident. Video footage shows Smagulov directing work at Chernobyl. In one year 13,000 samples from Chernobyl were analyzed at the Semipalatinsk nuclear site. Video shows the isotope laboratory at Semipalatinsk.

People's Deputy Petrushenko says whole generations of scientists have grown up at the Semipalatinsk nuclear testing ground, and no parent tells his child to leave.

Drilling workers criticize the Nevada-Semipalatinsk Society for meddling and trying to make them unemployed.

V.V. Pavlovich admits that he is in a difficult situation. "The people are not asking, they are demanding. We are on top of the situation. We are controlling these people; but, after all, in the future a situation may arise in which we will not be able to control them." Petrushenko says that it is difficult for him as a people's deputy to take an "objective" stance over the issue of moving the Semipalatinsk nuclear test site to Novaya Zemlya. Explosions will be more expensive at Novaya Zemlya, and the inhabitants there may object.

V.I. Gerasimov, chief of a main directorate of the Ministry of Defense, explains that it is impossible to give up testing unilaterally at present, as weapons must be tested and new weapons developed to maintain parity with the Americans. As soon as a treaty is signed at international level on the cessation of testing and the Americans support the Soviets, the Soviets will cease testing. So, it is up to the Americans.

A.D. Ilyenko, head of the Semipalatinsk nuclear testing ground, says the Supreme Soviet should adopt a decision on the future of the Semipalatinsk nuclear testing ground, to end the uncertainty and hullabaloo.

It is reported that the Institute of Nuclear Physics of Kazakhstan has started putting radiation monitors in public places in Semipalatinsk to reassure the populace. The documentary ends with video of a convoy transporting what is presumed to be a nuclear cargo.

### Central Asian Cloud Seeding Experiments Criticized

91WN0449C Dushanbe KOMMUNIST  
TADZHIKISTANA in Russian 13 Apr 91 p 2

[Article by K. Sirozhidinov, staff member of the Council for the Study of Production Forces of the Tajik SSR Academy of Sciences: "Shall We Let Loose Storms Upon the Earth?"; first paragraph is source introduction]

[Text]

### Concerning the Inadvisability of Artificially Increasing Atmospheric Precipitation in the Republic

The hypothesis that it is possible to increase the atmospheric precipitation in Central Asia artificially has attracted increasing attention from the scientific community since 1978. Atmospheric precipitation is the most important link in the circulation of water in nature, and it is for this reason that people have asked whether this natural cycle cannot not be changed. In other words, can we, by utilizing the enormous atmospheric reserves of moisture, accelerate and increase their precipitation over certain territories?

Science has answered this question positively. However, the questions of where, when, under what conditions and

to what degree we can in practice influence the natural course of the processes have remained a subject of scientific research. The danger presented by the drying up of the Aral Sea has exacerbated the situation. After 12 years of work, USSR Goskomgidromet [State Committee for Hydrometeorology] has formulated the technical-ecological groundwork for a plan calling for the implementation of large-scale projects to increase precipitation in the basin of the Aral Sea rivers, which includes territory in four Central Asian Union republics.

The following figures indicate the scale of the proposed projects within the Tajik SSR alone, where there is no need for this lavishness: the working area of the experiment (test site) chosen for the basin of the Amu Darya amounts, in terms of size, to about 40 percent of its area (55,000 square kilometers). It encompasses 23 rayons and 12 cities. More than three million people (60 percent of the republic's population) live in this territory. The working area encompasses the upper and middle reaches of the Vakhsh, the Kafirnigan and the Zeravshan, as well as the basins of the Shenkent and Karatag Rivers and the basin of those rivers on the left bank of the Syr Darya with internal drainage. This is all of Central Tajikistan, the Ura-Tyubinskaya group of rayons and the Gissarskaya Valley, including Dushanbe. That is the scale of the proposed projects.

USSR Goskomgidromet plans to begin in the next two-three years a set of large-scale projects to actively influence precipitation-forming cloud systems in order to artificially increase precipitation over the indicated area. It is proposed to carry out this action in the fall-winter-spring period.

The possibility of effectively interfering in the natural processes of cloud and precipitation formation is based on the premise that clouds represent unstable systems. Their long-term existence is explained by the low precipitation rates of cloud drops and the effect of air currents directed upwards. By influencing one factor or the other, that is, by contributing to the emergence of large particles or by suppressing the streams which are directed upwards, it is possible to accelerate the disintegration of clouds, having caused the emergence or intensification of precipitation. The simple method is to sprinkle water in the form of drops directly from an airplane; they enlarge 100-fold as they fall through a cloud. But for this it is necessary to convey to the sky tons and tons of water, something which is, of course, impossible.

The plan adopts two other methods of acting upon the phase instability of clouds: either seed them with cold reagents, which reduce the temperature of the surrounding air, thus leading to crystallization and to the activation of natural ice centers, or with reagents which are capable of playing the role of ice centers (foreign particles), thus removing the atmosphere from a stable state. It is proposed to use solid carbon dioxide as the cold reagent and silver iodide as the ice-like substance.



Introducing into the clouds either of these forms of crystallizing reagents leads to the intensification of the processes of precipitation formation. In this process airplanes, rockets, artillery anti-hail installations and aerosol generators on the ground are used for introducing the reagents into the clouds. Throughout the world the aircraft methods of acting upon clouds have become the most widespread, and they have been adopted as the main ones for this project. It is proposed that in the future a shift will be made to ground aerosol generators.

The process of aircraft seeding (by 15-16 aircraft) of the clouds with granulated solid carbon dioxide or of introducing silver iodide into them will be carried out during the cold period of the year (November-April, possibly October to May) for an average of approximately 40 days every year, 10 hours a day. The yearly seeding with carbon dioxide will amount to 2,160 tons, and with silver iodide from five to 20 kg.

The action is highly effective only when there is seeding of those forms of clouds which provide precipitation and only when there is natural development. In Tajikistan these winter frontal cloud systems are the main sources of winter precipitation. Only in this case does the increase in precipitation prove to be very significant, making the action economically advisable.

The plan calls for precipitation to be increased by 15 percent. Expressed in absolute terms, that is eight cubic meters for the Tajik SSR, which is obviously greatly overestimated. The problem is that the working area chosen for this action accounts for only 60 percent of the total yearly amount of precipitation, not 90 percent, as indicated in the plan, and the figure is even less for the basin of the Zeravshan River. On the other hand, drainage from the Pyandzh basin, which does not come within the test area, has been mistakenly included. And, finally, when the effectiveness of the work was being evaluated, the flow coefficient (the ratio of the amount of water going into the river flow to the amount of water which has fallen in the form of precipitation) was mistakenly accepted as equal to one in the project. But in reality, the flow coefficient in the area of the proposed work does not exceed 0.5 if precipitation falls in the form of snow and 0.7 if it takes the form of rain (let us note that in the winter in Dushanbe 70 percent of the precipitation is rain). For this reason the proposed 15-percent increase in the amount of precipitation will not increase the river flow by precisely that amount. In practice the increase in the river flow will be expressed by an extremely modest figure—2.2 cubic kilometers, which does not provide hope for the revival of Aral. For this reason the proposed large-scale program to actively influence the cloud systems of Tajikistan is not a realistic method of increasing the water resources; it is not capable of noticeably influencing the future fate of the Aral Sea. The people's wisdom says: you will not quench your thirst with dew.

Moreover, how can the results of the artificial effect be determined against the background of the existing natural variability of precipitation? The plan does not contain an evaluation of the probability that any differences which are revealed may arise from natural variability. In short, by no means have all aspects of the regional features of the cloud-formation and precipitation-development processes in the proposed work area within the Tajik SSR been studied in sufficient detail. Experiments have not been conducted in the republic, and this also casts doubt on the precipitation increase which is proposed in the plan.

It is also unclear what form the additional precipitation will take. Will it be rain, hail, or snow? It is possible that the implementation of the program will lead to an increase in the proportion of liquid precipitation in the winter-spring norm, which in our conditions is not desirable.

The large-scale program to actively influence cloud systems cannot fail to have a substantial negative impact on a whole range of socioeconomic and economic factors. Moreover, we cannot exclude the possibility that as a result of the action, the amount of precipitation falling during the season may be increased not by 15 but by 30 or more percent of the yearly norm. And such an increase would influence many things all the more negatively.

Because this is extremely serious, it is essential to name what threatens us.

The probability of avalanches in the winter and spring season and the formation of mud flows in the summer will be increased. The erosion and rock slide processes will be increased, and the stability of slopes will be disturbed. We must not forget that in Tajikistan the people have conducted a struggle against water for centuries, while in Uzbekistan and Turkmenia people are struggling for water.

There will be increased expenditures to keep automobile roads clear and to remove snow from the streets in cities and villages. Conditions for tourism and public recreation will decline.

There will be interruptions in the operation of the energy and water supply systems, and expenditures for fuel, especially solid fuel, will increase.

The health of the population will decline.

The climate will begin to change. After all, it is the mountain systems located both within the republic and outside it, rather than the Aral Sea, which exert a large influence on the climate of Tajikistan.

Local air pollution caused by the carbon dioxide and silver iodide will require, in turn, some measures to combat this phenomenon.

There will be disturbances in the natural course of precipitation during the planting (March-April) and harvesting (October-November) campaigns. Rain or snow



falling during these periods may interfere with either the preparatory or final work of the agricultural year. In addition, a cold spell in April, for example, is fraught with the possibility that apricot, cherry, apple and pear blossoms may perish completely. Frequent spring frosts will result in damaged grape leaves.

Additional moisture and snow cover in the territory will lead to later dates for the snow descent and, consequently, to a decline in the total amounts of effective temperatures.

Thunderstorm and hail phenomena in the winter period will develop.

There will be changes in the conditions of glaciers and snow cover on the slopes, which will influence the formation of water runoff.

As is well known, the water factor is the most important regulating and determining factor in the location of population within the territory of the republic. Nearly all our populated areas are located in groups in the lower reaches of average and shallow rivers, or along them with varying degrees of siting density, which emphasizes and increases the significance of the water factors. For this reason changing the natural conditions of water flow can lead to unforeseen negative consequences. The economic expenses to compensate for the consequences will be significant, growing from year to year; they will be a heavy burden on the republic's economy. The direct and indirect economic damage from the ecological changes will prove to be extremely significant. Consequently, the organization of large-scale work to control the distribution of water resources by artificially increasing the atmospheric precipitation over the territory of the Tajik SSR must be considered to be premature. What is required is the formulation of a long-term, comprehensive and well-planned experiment on a lesser scale, which would stipulate the establishment of a monitoring system; it is assumed that this plan for an experimental phase will be coordinated with the republic.

But for now, proceeding from the premise that here, in Tajikistan, a man's life is more closely related to the life of nature than it is in other places, we consider it inadvisable to change the environment which surrounds him.

Scientists and specialists from the republics of Central Asia and Kazakhstan have arrived at the same opinion on the inadvisability of carrying out this work. The opinion was shared by those who participated in the international symposium entitled "The Aral Crisis: Why It Happened and How to Resolve it," which took place in the fall of last year in Nukus. But it is essential, of course, to publicize this very serious ecological situation.

### Heightened Morbidity in Altay Kray Associated With Contaminants

91WN0449A Moscow PRAVDA in Russian 25 Apr 91  
Second Edition p 6

[Article by PRAVDA correspondent S. Vtorushin, Altay Kray: "Take Off Your Dark Glasses and Then It Will Be Clear Why Our Children Are Being Born Sick"; first paragraph is source introduction]

[Text] Three-month old Slava, despite all of his mother's care, has landed in the hospital again. I had only a brief glance at him and left the room. There is nothing worse than looking at a helpless child.

Slava's illness, as the doctors told me, is very serious, although to a non-specialist it may not be so noticeable. At the age of three months the infant's movements still are not coordinated, but only a physician could detect the deviation from the norm. Slava was trying to move his little hands and feet. But I knew that he was a profoundly sick boy with atrophy of the muscles and as a result of this, delay in the development of his entire body. The doctors think that there is a chance that he may get better, although the sequelae of the disease will always be there.

But there are children who are worse. A boy named Alyesha is growing up in a community not far from the city of Gornyyak. He is already a year old but he is not standing yet. And he will not stand. The boy was born completely paralyzed. He had a cerebral hemorrhage at birth.

There were children like this born before. The doctors would look for explanations in individual cases. But in 1989 the number of newborns with damage to the central nervous system sharply increased in Loktevskiy Rayon. The number ran into the hundreds. Moreover, all the infants were distinguished by the yellow color in their faces. This meant that the child who had just come into the world already had a sick liver.

"We immediately began to look for the cause," said S. Trebunskiy, chief physician at the Loktevskiy Rayon Hospital. But the main point was to save the children. They all had extremely high blood bilirubin counts. This disease is commonly called jaundice. In newborns it is related to lesions in the central nervous system.

They raised the alarm in Altay Kray. A special brigade was sent to Loktevskiy Rayon: specialists from the kray pediatric clinical hospital and the local medical institute came, as did representatives of the public-health and epidemiological services. By this time one child had already died.

Jaundice is not a new disease; people have learned to conquer it. And with the help of the specialists they worked out a method of treatment here; the necessary equipment and medications were allocated to the rayon hospital. They started to save all the yellow babies. But where do the roots of the disease lie?

When trying to answer this question, they recalled the fire which took place at the mine in the summer of 1988. In Gornyak they mine polymetallic ore, which contains heavy metals harmful to the human body: lead, zinc and cadmium. When the mine caught fire, toxic smoke spread over the city and surrounding areas. Its pungent odor did not go away for three months. And in the spring of 1989 the yellow children began to be born in Gornyak. But they did not succeed in proving a link between the two events. The fact was that by that time the same problem had appeared in Talmenskiy Rayon, which was 400 kilometers away. It had no mine or polymetallic ores.

They did not manage to prevent the birth of yellow children, but here, too, the doctors were able to organize treatment for them. How effective was it? I asked this question of Professor A. Fedorov, chief of the pediatric diseases department at the Altay Medical Institute.

"Of the 757 infants whom we studied, about 500 proved to have pathologies of the central nervous system," he said. "In some it passes, but in others it remains for life. But even in those who recover, the nervous system is weakened. This kind of person may fail to cope with a vital situation at a critical moment."

In the search for causes of the disease the specialists first of all studied pregnant women in detail. It turned out that more than half of them had anemia. Characteristically the anemia started when the pregnancy became noticeable. Before that the woman was healthy. The anemia led to the child being born sick. In the mother's uterus it suffered from oxygen deficiency. Many newborns were coming into the world not only yellow but also with elevated intracranial pressure and hydrocephalus. The vessels of their brains were so fragile that intracranial traumas was observed even in those who were born by caesarian section.

They discovered another phenomenon. The milk of many mothers was found to contain toxins—DDT, hexachlorane, and heavy metals. One cannot breast feed a child with milk like that. That is when the doctors turned their attention to ecology.

The chief physician at Loktevskiy Rayon Hospital mentioned the following fact. At one time three years ago, when toxic chemicals were being used to cultivate the fields, a pilot forgot to shut off a valve when flying over the village of Gilevo. Half of the gardens in the village ended up under the toxic rain. No one told the people that it was necessary to destroy the entire harvest from their gardens, and the doctors found out about it too late. And this was not the only case. Several years ago near Novosibirsk hundreds of garden plots were "cultivated" in the same way.

But agriculture is not the only culprit in the ecological disaster. Every year the industrial enterprises of the Altay discharge 747,000 tons of harmful substances into rivers and the atmosphere. Many plants, including the largest ones, do not have treatment facilities even now.

The following example shows the kind of danger that exists here. The Altay is traditionally a cheese-making area, and even quite recently its cheeses were renowned throughout the country. But today in many areas it is impossible to make cheese from the local milk because its chemical composition has changed so much. The situation in Altay's neighboring regions, in the Kemerovo and Novosibirsk Oblasts for example, is no better.

"Meanwhile there are no yellow babies there now," says Professor Ya. Shoykhet, vice-rector of the Altay Medical Institute. He is the director of a scientific council under the jurisdiction of the republic's program for the protection of maternal and infant health in the kray. "In addition to all these problems in the Altay, there is still another powerful factor—the consequences of the nuclear weapons testing in Semipalatinsk. We are not talking about current tests, but about those which were conducted on the ground and in the atmosphere from 1949 through 1963. After all, the mothers of the yellow babies are women who themselves were born in precisely those years and immediately after them. No one knows what dose of radiation they received but that they were subjected to it is not in question. A yellow baby is the consequence of the influence of a whole range of factors."

What is the solution? The doctors and the local organs of authority are doing everything in their power to improve the health of the newborns. Pregnant women with anemia are prescribed a high-calorie diet. They receive, in addition to the current meager ration, extra coupons for meat and other foodstuffs. They are assigned places in the sanatoria and preventoria of local enterprises.

Procedures for the storage of fertilizers and toxic chemicals have been tightened up. All farms which do not have safe storage facilities are forbidden to use them. But the general situation has not yet been fully corrected.

For many years we were too complacent not only about the health of nature but also about our own health. When they began to use chemicals on a large scale in agriculture, the departments worried only about the production of fertilizers and toxic chemicals. They reassured people that these products would increase yields, but no one explained how carefully one needs to deal with this powerful force, which is called to life by the will of man. Otherwise, the caked snowy mountains would not have been piled up in every village. The good was turned into a genie released from the bottle.

In order to have healthy offspring we need to fundamentally re-examine our way of life. When we finally take off our dark glasses we will see that the streets of many of our cities resemble garbage dumps, the air is at least half smoke from chimneys and car exhausts, and the water resembles a cocktail of impurities.

We do not yet have the instruments to detect harmful substances in the food products which we use. Recently they have started to reveal just the nitrate content. But,

after all, nitrates are not the only ones which damage the human body: there are other toxic chemicals as well. The public-health services came up with the so-called maximum permissible concentrations. That means that the toxins can be used but.. in limited quantities! There is nothing like it in any civilized country!

After I returned from a business trip to Barnaul, I learned that yellow infants had appeared in other parts of the kray. The Altayskiy Rayon already had 25, and this figure was not the upper limit. The alarm bell had been rung in the Troitskiy Rayon...

### **Novel Sorbent Permits Petroleum Reclamation**

*PM1306145991 Moscow Central Television First  
Program Network in Russian 1800 GMT 10 Jun 91*

[From the "Vremya" newscast: Report by I. Patsevich, identified by caption, from Arkhangelsk Geological Prospecting Institute]

[Text] [Announcer] The Arkhangelsk Branch of the All-Union Scientific Research Institute of Geological Prospecting for Petroleum has been successful in developing an original preparation for mopping up petroleum and petroleum product spills.

[Patsevich] Petroleum is added to a bowl of clean water. Then a powder developed at the institute is sprinkled on it. And here is the same bowl a few seconds later. Literally, before our eyes the petroleum has turned into a plastic substance which is easily removable. A small touch [laboratory assistant adds something to the bowl]... and the water in the bowl is virtually clean.

[Yu.I. Kuzmin, candidate of biological sciences, identified by caption] I know of no other sorbent which is ecologically as clean, and which, moreover, is made from production waste for which there is virtually no other use today. And most important—which makes it possible to regain the use of the spilled petroleum products.

[Patsevich] Let me clarify, with the help of this preparation it is possible to regain the use of 96 percent of the petroleum products which seemed lost for ever. And there are other advantages. The sorbent does not sink. It is effective in virtually any water temperature, in both fresh and salt water, and it is not harmful to the flora or fauna as the results of an official expert assessment have demonstrated. The preparation exists and can be used right now to clean up small reservoirs which have been turned into petroleum cesspools by man.

## REGIONAL AFFAIRS

**ESA Inaugurates Earth Observation Coordination Center**

91WS0333X Paris AFP SCIENCES in French  
18 Apr 91 p 13

[Text] Paris—The European Space Agency's (ESA) Center for the Coordination of Payload Data for Earth Observation Missions was inaugurated 12 April in Frascati, near Rome, by the ESA's general director Jean-Marie Luton. The announcement was made by the ESA in a communique received in Rome.

The center was also inaugurated by the state undersecretary to Learco Saporito, the Italian minister of universities and scientific research. It is housed in the European Institute for Space Research (ESRIN). All the "ground sector" activities of the first European Earth observation satellite—the ERS-1, which is scheduled to be launched by Ariane on 3 May—will be planned and prepared there.

With its hyperfrequency radar instruments capable of penetrating clouds and darkness, the ERS-1 will be able to furnish a whole set of valuable data on our planet and environment. The ESA stresses, however, that the important part of an Earth observation mission is not the satellite itself, but the information that is collected on the ground.

The "ground sector," which is responsible for receiving and processing this information and communicating it to users, therefore plays a crucial role in the success of the mission. For the ERS-1 and later missions (ERS-2 followed by a series of polar platforms), the task has been entrusted for several years now to ESRIN, within the framework of the European Earthnet Program.

**Swedish Deputies Approve Oeresund Bridge to Denmark**

AU1306090491 Paris AFP in English 0859 GMT  
13 Jun 91

[Text] Stockholm, June 13 (AFP)—Sweden's single-chamber parliament, the Riksdagen, on Wednesday approved a proposed bridge across the Oeresund, a 10 mile (17 kilometre) strip of the Baltic Sea between the southern city of Malmo and the Danish capital Copenhagen.

Deputies voted by 229 to 85 with five abstentions after an eight-hour debate on the project which would establish a rail-road link between the two Scandinavian countries.

Among opponents of the bridge, the ecologists described the project as an "iron and concrete gravestone" for the Swedish government's environment policies.

The Danish parliament, the Folketinget, will vote on the project at a special session in August.

## FRANCE

**Nation Seen Lagging on Environmental Standards**

91WN0460A Vienna DIE PRESSE in German  
30 Apr-1 May 91 p 19

[Article by Reinhold Smonig: "Ecological Challenge for France: Paris Struggling With Environmental Directives From Brussels"]

[Text] Paris—Just as in thousands of other small municipalities in France, the household trash of Cornivet, a community of 350 souls in the west of France, is collected and deposited every Tuesday at the municipally owned landfill at the direction of municipal authorities. Packed nice and tidy in plastic bags, the rubbish from the approximately 100 households and four businesses builds up into quite a pile. Then a municipal employee sets the pile on fire and, if needed, gives it a little boost with the contents of a gasoline canister, whereupon the thick smoke with its dust particles and its toxic gasses disperses over the countryside. Just as in Cornivet, this is the way that "waste disposal" is still being taken care of in thousands of French communities—including even urban communities of respectable size.

A secondary school class from Austria is in the capital on its week-long visit to Paris. Most of the young people are armed with cameras. They stock up on film at a photo speciality store. One of them takes the opportunity to replace a button battery and asks the photo dealer to take his old battery back for disposal. With a curt gesture the man points to the wastebasket in the store.

**Battery Disposal Largely Unknown**

The students are horrified, but the man does not understand the agitation. A separate disposal system for batteries, with the exception of a few pilot projects, is still unknown.

Its waste incineration installation was, until recently, the pride of Poitiers, a regional capital city in central France. Designed for the incineration of 50,000 tons of household refuse annually, at the same time the installation supplied an entire section of the city with remote heat. A local scandal is left over from the pride of the early 1980's: To date, only the dust particles have been filtered out in the smokestack and the toxic gasses are released unimpeded over the countryside, while the highly toxic incineration residues are being deposited in the local landfill and are growing into a regular mountain on the northern approaches to the city—a situation which by no means satisfies the requirements for handling special waste materials.

Open street sewers with waste water from washbasins, washing machines, and dishwashers are no rarity even in small-sized towns. How could it be otherwise? In France, in contrast to most other EC countries, there continue to be no legal regulations or coercive measures which legally obligate the municipalities to treat their waster

water. Indeed, thus far hardly more than one-third of France has been equipped with central sewage treatment facilities.

The examples very clearly show the severity of the situation that France is facing in the form of existing and planned EC directives in the area of the environment. Minister Delegate of the Environment Brice Lalonde has recently sounded the alarm and roused his fellow politicians a number of times. A flood of proposals for national environmental legislation has been let loose with the goal of transforming applicable EC guidelines into national law. While, for instance, Paris is already seriously in default in regard to refuse disposal, attempts are under way in other areas to anticipate EC directives that are still being developed.

The biggest handicap for France in this regard is the large number of municipalities. After all, with no less than 36,000 communes, the country has more municipal administrative units than all of the rest of the EC put together. Moreover, the great decentralization reform of 1982 increased the authority of these mini-administrative units that now have to solve problems for which the framework of a dozen or a few hundred inhabitants is not suitable. Yet the consolidation of municipalities is not popular and cooperation among municipalities—something that Paris is working for—leaves very much to be desired in practice.

Becoming a part of the proper refuse disposal system of the consolidated neighboring municipalities is too expensive for the little community of Cornivet mentioned at the outset and it prefers to stick to its "rough and ready" community landfill. In Poitiers they are deliberating transition deadlines for the filtering installations at the waste incineration facility which, according to EC directives, are already necessary. The various urban municipalities are battling for loans and subsidies for the waste water treatment infrastructure which is gradually being recognized as an urgent matter. In all of this, however, most of France will not be affected at all: The latest EC directive requires general waste water treatment by the year 2005 only for communities with more than 2,000 inhabitants—the numerous small municipalities will fall through the cracks.

#### **Company To Build 100 kW Chemical Heat Pump Prototype**

91WS0292X Paris INDUSTRIES ET TECHNIQUES  
in French 8 Mar 91 p 67

[Article by Cecile Remy: "Cooling by Chemical Means"; first paragraph is INDUSTRIES ET TECHNIQUES introduction]

[Text] Four licensed companies are commercializing the chemical heat pump developed by CNRS [National Scientific Research Center] and Elf Aquitaine. A clean process, without CFC [chlorofluorocarbon] or substitute.

The chemical heat pump has left the laboratories. Five refrigerator vehicles equipped by Faiveley will test it in 1991. Quiri, which specializes in industrial refrigeration, plans to build a 100kW prototype. Germany's Dornier is combining this technology with solar collectors for refrigeration and environmental control systems. And Sofrigam is developing portable refrigerators. These four companies have acquired licenses to commercialize the STELF [Elf Thermochemical System] process developed by France's Elf Aquitaine and the CNRS's Institute of Science and Engineering of Materials and Technologies at Perpignan.

#### **Production and Storage of Heat**

The STELF process is based on the exothermicity of the chemical reactions between a solid and a gas. Heat is released when the gas reacts with the solid to form another gas, and heat is absorbed, producing cold, in the inverse sense. Thus, the principle is equally applicable to the production and storage of cold and of heat. The gas is ammonia; and the solid is an expanded graphite encompassing salts—calcium chloride or manganese chloride, for example.

Manufactured by Carbone Lorraine, this reagent has the advantage not only of being a conductor and very porous, but also of being easy to use: 1 kilogram of reagent, with a storage capacity of between 450 and 700 Watt-hours, supports the operation of a machine with a power rating of approximately 1 kilowatt for approximately half an hour.

Several reactors are interconnected. The transfer of gas from one to the other takes place in accordance with the temperature and pressure differences among them. The starting thermal energy is supplied by a heat source: for example, a gas or fuel-oil burner, an electrical resistance, or solar collectors, or even energy having no commercial value. For applications where continuous production of energy is needed, the system includes four tanks interconnected as individual pairs, each pair operating 180 degrees out of phase with the other. Thus, configurations vary according to continuous production and storage requirements.

The system uses no CFC, is clean from an environmental standpoint, and stands to compete seriously with compression techniques. It can operate throughout a temperature range of between -50°C and 350°C, versus 0°C and 220°C for adsorption based on zeolite, and less than 150°C for liquid gas absorption systems. The STELF system is also cheaper and more efficient than the Japanese chemical heat pump based on the use of rare earths and hydrogen.

Although the first licensees are using STELF to produce cold, other applications are feasible. In particular, a EUREKA project has been submitted for the air conditioning of buildings. Elf Aquitaine is prepared to concede other licenses.



### Company Presents 'Clean' Circuit Soldering/Cleaning Machine

91WS0298X Paris INDUSTRIES ET TECHNIQUES  
in French 22 Mar 91 p 69

[Article by Ridha Loukil: "Electronic Circuit Boards: Exit the CFC's [chlorofluorocarbon]"; first paragraph is INDUSTRIES ET TECHNIQUES introduction]

[Text] Circuit board assembly has made peace with the environment. With Soltec's machine for soldering in an inert atmosphere, there is no longer a need to clean the circuit cards, and consequently, no need to use CFC's. The user not only solves the problem of the infamous chlorofluorocarbons accused of destroying the ozone layer, but also saves on cleaning equipment.

The use of CFC as a solvent for cleaning circuit boards is tied to the use of more flux than needed for the solder itself. These fluxes are chemical products deposited on the card by pulverization. They serve first of all to strip clean the solder points and the composite plates to assure the adherence of the solder. Next, they prevent the oxidation of certain metallic elements during the pre-heating which prepares the card for the soldering operation. Finally, they guarantee the quality of the solder by retarding oxides and undesirable particles brought in by the wave of solder. Indeed, part of the flux remains on the circuit card. The cleaning serves to eliminate these residues which would interfere with the test.

Chlorofluorocarbons constitute an excellent cleaning agent, washing and drying in a single operation, in very simple installations. However, they are considered harmful to the environment and have become the object of stricter and stricter restrictions.

For the electronics industry, the problem takes on importance with the development of surface mounting. Here, the residues escape more easily into the air, hiding between the composites and the substrate. Faced with environmental constraints, the industry is exploring two courses. One substitutes the current fluxes with new, water-soluble fluxes, so that cleanup could be carried out with little or no CFC's. While this solution does not entail any modifications, it presents the inconvenience of requiring a purification station at the beginning of the assembly line. The other course involves using a solder in an inert atmosphere, a process which, by suppressing the risk of oxidation, eliminates the need for flux, making cleanup unnecessary. This is the course of action followed by the Dutch company Soltec, represented in France by the firm Jybac Technologie.

### A Consumption Rate of 12 Cubic Meters of Nitrogen per Hour

Their machine looks like a tunnel 9.5 m long, with an airlock at the entrance, an airlock at the exit and a chamber for two soldering passes. All these modules are filled with nitrogen. It is the first on the market with an airtight soldering chamber, where the concentration of

oxygen is kept below 10 ppm. The circuit board enters the solder chamber only after the entry airlock is evacuated and filled with nitrogen twice. By the same token, it does not pass to the exit airlock until that has been twice evacuated and filled with nitrogen. It files through the interior of the tunnel automatically every 30 seconds.

Twice as expensive as an open-air soldering machine, the Soltec machine consumes more than 12 cubic meters of nitrogen per hour. The basic model costs 1.4 million French francs [Fr], the version with the most outfitting about Fr1,800,000.

A prototype machine was installed at Philips in Eindhoven in the Netherlands. It is also undergoing trials in Germany at AEG in Nixdorf and Sel (Alcatel).

### Renault Studying Auto Parts Recycling

91WS0274X Paris AFP SCIENCES in French  
28 Feb 91 pp 45-46

[Text] Paris—The two million junkheaps that end up in the wrecking yard each year are a big problem for automakers. So the companies, often flatly accused of contributing significantly to the degradation of the environment, are embarking on sweeping and expensive research programs, on all fronts.

Renault, for instance, currently employs nearly 1,000 people and spends more than 800 million French francs [Fr] a year trying to develop "clean" engines, less polluting motor fuels, and safer and quieter cars. "The environment," says Mr. Paul Percie du Sert, the company's environmental policy representative, "has come of age at Renault."

The problem of wrecks is especially difficult as the destroyed vehicles, which average 10 years in age, were built at a time when the care taken to protect the environment was not what it is today.

It is true, stresses Mr. Percie du Sert, that 75 percent of a vehicle is composed of metal, whose recovery today is part of a well-oiled circuit. But that leaves 25 percent of the components, such as plastics, rubber, and minerals, unrecycled. They represent an annual mass of nearly 400,000 metric tons, which will have to be disposed of in the future somewhere besides dumps.

For metals Renault has managed, without sacrificing optimal quality, to recycle 85 percent of aluminum alloys, 30 percent of steels, 100 percent of cast iron pieces, and 70 percent of battery lead. Today a Clio contains at least 30 percent recycled metal. Furthermore, Renault reconditions engines in its Choisy-le-Roi factory and recycles most of the used oil collected from its dealers and agents.

But the solution for the future, Mr. Percie du Sert emphasizes, is to create new and reusable materials for all nonmetal vehicle parts. The parts will have to be easy to disassemble, which means recycling will have to be taken into account at the vehicle design stage. They will

also have to be easily identifiable, and Renault-Volvo are now collaborating with Peugeot Ltd. on defining a joint marking or identification standard.

The inside panels of Clios and Renault-19s are already manufactured from recycled materials and this trend, according to Mr. Percie du Sert, will grow for other recycled materials and other models in the future. Likewise, the many plastic components of the next Renault Espace will all be marked and thus identifiable.

At the same time, Renault has just set up a pilot center to disassemble wrecked cars in its Flins factory: notably to study the stripping and disassembly times of different kinds of wrecks. Renault's research directorate, in partnership with the Cibie Company, is also preparing a study on industrial disassembly and how to optimize the crushing of wrecks.

## GERMANY

### 'Environmental Crimes' Caused by Soviet Army Described

AU1106094791 Hamburg BILD AM SONNTAG  
in German 9 Jun 91 pp 6-7

[Unattributed report: "At Night the Trucks With the Russian Scrap Come"]

[Text] Ruppiner Switzerland—the Brandenburg region northeast of the Berlin-Hamburg highway was once as beautiful as its name. Dense pine forests, interspersed with green birch trees, small, hidden, clean lakes, and a lot of deer and mushrooms.

Once upon a time.... There where once there was forest, only desert is left. Lakes are poisoned, the soil is contaminated a meter deep. And everywhere there are billboards: "Entry prohibited! Taking pictures strictly prohibited! Shots Are Fired Here!"

A Russian restricted area. For decades, the Soviet Army practiced war here. Shots were fired, bombs were dropped, everything was destroyed day and night. Now the Red Army is simply dumping what it does not want to take back home: wrecks of fighter planes and bombers, rotting tanks and trucks, heaps of mines and grenades, tonnes of live ammunition.

In the treaty on the withdrawal of the more than 400,000 Russian soldiers from the former GDR, it is clearly stated that the Soviet Army also has to remove its debris. During his visit to Moscow this week, FRG Environment Minister Klaus Toepfer once again held urgent discussions on this topic. The Soviet leaders promised him that they would "take all ecological requirements into consideration." The troops are already busy recultivating the land and removing waste and scrap, it was said. An empty promise.

### Taking Pictures Is a Danger to One's Life

The pictures that BILD AM SONNTAG shows here prove how the Russians really remove their debris. They were taken at risk to the photographer's life in a 2,700-hectare area north of Neuruppin. The young forester Frank Schroeder (26) of the Neuruppin Forestry Enterprise has repeatedly been shot at when he tried to document the environmental crimes of the Russians.

The illegal waste dump starts directly behind Frankendorf, which has 300 inhabitants. A small path into the forest suddenly becomes six times wider. "The runway of the Russians," Frank Schroeder says. "Starting from Neuruppin, they have deforested all the woods here so that their tanks can reach the exercise and operations sites by the shortest route."

### Oil and Gas Seeping Into the Ground

Behind a small wood in which the Soviet soldiers simply hacked off young trees at a height of 60 centimeters, there is a macabre graveyard: dozens of crashed MiG jets and Sukhoi-17 fighter bombers; burned out tanks and trucks; bulldozers destroyed by rust; tank engines still filled with oil. "For weeks heavy trucks have been coming by night," Frank Schroeder says, "loaded with this scrap. And then it is simply dumped here."

There are several of these "graveyards" in this restricted area. The soil is contaminated for kilometers. "Millions of liters of oil, gas, and kerosene have seeped into the ground here over the years," the young forestry employee says and, as evidence, he takes out his lighter. A jet flame immediately shoots up beside a discarded tank hatch.

In the middle of a clearing there are dozens of large barrels, filled with kerosene—the targets of low-altitude attacks. "Entire stretches of wood were recklessly burned with bombs," Frank Schroeder says bitterly. "The fires had to be extinguished by the civilians from the surrounding villages. If one stretch of wood could no longer be used as an area for maneuvers, the billboard saying 'restricted area' was simply moved a bit further on."

Wild boars and deer have long left the area. The few that are still around in the surrounding forest are poached by Russian soldiers. "They simply pour out a barrel with herrings and pieces of bread and lay wire snares everywhere," Frank Schroeder says. "And in the lakes they wash their tanks."

The restricted area near Neuruppin is probably not an isolated case, experts assume. In Brandenburg alone the Soviets have 21 troop exercise sites on 120,000 hectares. Millions of square kilometers were deforested or burned. This has also had an effect on the weather in the region. According to meteorological records, rainfall has clearly been reduced in Brandenburg.

"So far, everybody has kept silent," Frank Schroeder says. "But now this mess must be made public." He is

therefore exhibiting his photographs at the first all-German Agricultural and Forestry Fair, DLG-agra, which starts in Leipzig today (Hall 18, Stand 483, magazine FORST UND TECHNIK). "Even though I know that the old bigwigs are still sitting in many posts in forestry and that might cost me my job."

## ITALY

### FIAT's Ecological Programs Outlined

91WN0453A Rome L'ESPRESSO in Italian 12 May 91  
p 185-187

[Article by Massimo Mucchetti: "State of Grace"—first paragraph is L'ESPRESSO introduction]

[Text] Following government financial support for investments in the south, FIAT will soon receive support for environmental aid. Storm of a trillion lire.

The Agnelli family has found an associate for FIAT. The partner does not demand stocks, does not attend board meetings, does not vote in plenary sessions. But in order to balance the accounts of the Turin group the partner is being revealed as being more precious than its 113,000 stockholders, because it furnishes the risk capital that the stock market is not able to attract. On the other hand, with the resources available on the business market, a group such as FIAT cannot develop an integrated factory, meet the ecological challenge and guarantee itself the maximum flexibility in using labor and facilities. These are the three fundamental challenges of the 1990's, the last "protected" decade before the invasion of Japanese automobiles. The new FIAT "associate" is the government, that is, the government headed by Giulio Andreotti. His assistance is manifested in the concession of direct and indirect aid for an enormous amount of money, already more than 5 trillion lire, which could rise to 7 trillion in coming years if forecasts of the automobile market's recovery turn out to be unfounded.

These are crucial weeks. The Council of Ministers is preparing to study the so-called environmental taxes, political problems permitting. They are a collection of provisions which should, among other things, finance the introduction of catalytic converters on new automobiles, of a retrofit on old automobiles and clean diesels beginning on 1 January 1992, a year ahead of community requirements. This is the first and most delicate chapter of the project's contract stipulated solemnly in Turin on 6 February 1991 by Environment Minister Giorgio Ruffolo, and FIAT Managing Director Cesare Romiti. This is an essential agreement needed to recover the ground lost to the German, Japanese, and American companies which have already taken action with the support of their respective governments on the environmental impact of automobiles.

The structure of the operation is complex. The government is considering an average price of 1.2 million lire for the catalytic converter. In the first half of 1992, it will

give the purchaser a grant of 800,000 lire for each new automobile with a catalytic converter and with a cylinder capacity of less than 1,400 cc, and a contribution of 600,000 lire for automobiles with a higher cylinder rating. In the second half of the year, the contributions will decline respectively to 600,000 and 400,000 lire. The estimated expenditure will be 350 billion lire because the government estimates that 600,000 autos with catalytic converters will be available next year on the Italian market.

And what about automobiles already on the road? For those registered after January 1988, provisions are made for a contribution of 580,000 lire in 1992 and 1993 which would pay for the installation of the retrofit, a kind of catalytic converter adapted to the old exhaust system. This will cost the government 320 billion lire. Finally, the clean diesels. FIAT has said it will offer diesel engines that conform to the severe EEC limits on polluted emissions. The supertax will be ignored for this type of vehicle. In the next two years, the shortfall in tax revenues would be around 165 billion lire. In order to finance the "clean auto" operation, the government therefore must spend a total of 835 billion lire. This consists of an indirect aid program to automobile producers which has already been tried on a large scale in Germany in recent years. For the FIAT group, which holds little more than half of the Italian market, it is a good opportunity to create difficulties for some foreign competitors, especially the French and the Spaniards.

Where will the government find these 835 billion lire? To a large extent the money will be furnished by ENEL [National Electric Power Company] through the new taxes on emissions of carbon dioxide, sulphur dioxide and nitrogen oxides. Then there will be an increase in the tax on production of CFC [chlorofluorocarbon] and on plastic containers. Since ENEL, Montefluos, and other companies will add higher taxes to prices, "operation clean auto" eventually will be paid for to some extent by everyone. FIAT plans a definitive reply on the subject in time to start producing vehicles with catalytic converters and clean diesel engines. Romiti said in February, "It is indispensable that regulations concerning incentives be approved by 30 June 1991."

But the government must deal with other incentives provided for in the project's contract such as those for research on the "green auto" and for refuse disposal, for aid to the areas at risk in Campania and Lombardy and for construction of new plants to produce electrical energy. This will be used in part by the group's establishments, and in part by ENEL. That company will be the last payer—and at indexed prices—permitting FIAT to gain "marginal" tens of billions of lire in profits. Turin has projected an expenditure of more than 2.6 trillion lire for these investments, 1.5 trillion of which will come—in the form of easy credit, and more rarely of contributions to the capital account—from the Ministries of Industry, Environment, and Scientific Research. FIAT is energetically working on this delicate game,

convinced as it is that those who lose the ecological challenge will have to forsake the automobile market in advanced nations.

At FIAT headquarters in Turin they are certain that there will be no surprises. The government has just shown that it wants to respect the agreements stipulated with FIAT by unblocking, through decisions of the CIPI [Interministerial Committee for Industrial Programming], the 3.143 trillion lire in aid, of which more than 1.6 trillion is in a sinking fund, for the new plants at Melfi, Basilicata, and Pratola Serra in Campania.

The decision was made on 18 April. A week earlier Romiti had accused the political class in the Bicameral Commission for State Holdings. Referring to the group's new plants in the south, he said: "We are able to set up plants in a week but you have no idea of the political and bureaucratic problems that will arise." Earlier, the head of the Ministerial Department for the South Antonio Da Empoli, had disclosed, "We have no more resources for the south; we must refinance Law 64." On 20 February FIAT president Giovanni Agnelli and Romiti had talked about it with Andreotti, reminding him that the new plants of the Turin group would have created 8,530 direct jobs and 8,500 trainee positions.

Two months later, the CIPI took action. And The Lawyer [Agnelli] considered it when, at the Florence conference on Saturday, 20 April, he cooled off the furor of Confindustria [General Confederation of Italian Industry] President Sergio Pininfarina, and supported

the government, inviting the nation to seek harmony and putting everyone on guard against the leagues.

With the enormous investment in the south (totalling 6.672 trillion lire), FIAT completes the other hinge of its strategy for the 1990's: the technological and organizational aspect. New models and engines will be produced according to a very new organizational philosophy borrowed from Japan: The integrated plant will practically eliminate warehouses, tying contacts in real time with the suppliers located in a radial arrangement around the plant.

With this move, which is added to the new plants FIAT is planning in Poland and the Soviet Union, Turin will prepare to increase its own productive capacity from 2.3 to 3.5 million units. The Lawyer is optimistic about the future. Also the experts. In 1994, when Melfi and Pratola Serra will be fully on line, the resumption of the automobile industry will already be at a satisfactory point. Everyone must work. But what if forecasts are wrong? At FIAT headquarters they do not even want to hear talk of this, but FIAT would not be unprepared even in this negative scenario. If the present crisis should continue, the plant would be forced to cut back, probably in the north, by the same number of jobs created in the south. It would be unpleasant, but not too difficult, trade unionists confess, to reduce by 5,000 units the ranks in Turin plants of Rivalta and Mirafiori and of a like number at Alfa Romeo in Arese, at Autobianchi Desio, and at the Innocenti plant at Lambrate. Having granted early retirement to Olivetti workers at age 50, the government certainly could not deny similar dispensations to FIAT if Turin were to ask for it.



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